

MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXIV.

Published every Thursday at 418-19 Perry-Payne Bldg., by the Marine Review Pub. Co.

CLEVELAND, O., JULY 11, 1901.

Subscription \$3.00 a year.
Foreign \$4.50 a year.

No. 2

STILL TWO MILLIONS SHORT.

TONS OF FREIGHT MOVED TO AND FROM LAKE SUPERIOR TO JULY 1 OF THIS YEAR AS COMPARED WITH THE SAME DATE A YEAR AGO.

Quite an important gain was made during June in the movement of freight of all kinds to and from Lake Superior. The tons of freight passing through the canals exceeded four and a half millions, and the month was the greatest in the history of Lake Superior commerce, but there is still a shortage for the season to July 1, as compared with July 1 a year ago, of 1,906,561 tons. The figures representing tons of freight are 6,767,120 to July 1, 1901, 8,673,481 to July 1, 1900, and 6,409,086 to July 1, 1899. The shortage in iron ore is, of course, most noticeable, but in coal and wheat there is also a marked decrease. Of soft coal only 982,411 tons passed up through the canals to July 1 this year, as against 1,422,601 tons to July 1 a year ago. On July 1, 1900, 19,145,392 bushels of wheat had passed down from Lake Superior. The total to July 1 of this year is 9,381,344 bushels. As regards flour and grain other than wheat the movement is about the same as it was a year ago. The combined commerce of the two canals, Canadian and United States, is very fully discussed in the following tables:

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To July 1, 1901.	To July 1, 1900.	To July 1, 1899.
Coal, anthracite, net tons.....	196,823	229,052	257,319
Coal, bituminous, net tons.....	982,411	1,422,601	696,227
Iron ore, net tons.....	4,334,514	5,475,267	3,917,675
Wheat, bushels.....	9,381,344	19,145,392	13,698,691
Flour, barrels.....	1,877,161	1,854,784	1,600,361

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO JULY 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.

ITEMS.	Designation.	To July 1, 1901.	To July 1, 1900.	To July 1, 1899.
Copper	Net tons....	24,647	42,331	26,135
Grain, other than wheat	Bushels....	4,479,685	5,383,774	11,473,996
Building stone	Net tons....	10,494	6,408	1,273
Flour	Barrels....	1,877,161	1,854,784	1,600,361
Iron ore	Net tons....	4,334,514	5,475,267	3,917,675
Iron, pig	Net tons....	10,953	4,092	8,949
Lumber	M. ft. b. m.	247,772	250,968	254,754
Silver ore.....	Net tons....	.....	.....	.....
Wheat	Bushels....	9,381,344	19,145,392	13,698,691
Unclassified freight	Net tons....	9,388	15,282	48,201
Passengers.....	Number....	6,531	5,077	3,615

WEST BOUND.

Coal, anthracite.....	Net tons....	196,823	229,052	257,319
Coal, bituminous.....	Net tons ..	982,411	1,422,601	696,227
Flour	Barrels	180	110	.....
Grain	Bushels....	36,330	.....	9,500
Manufactured iron.....	Net tons....	28,959	46,901	38,295
Salt	Barrels	172,751	94,215	133,287
Unclassified freight.....	Net tons....	139,515	135,285	115,326
Passengers.....	Number ...	7,428	5,210	4,704

SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To July 1, 1901.	To July 1, 1900.	To July 1, 1899.
East bound freight of all kinds, net tons.....	5,392,954	6,825,444	5,281,821
West bound freight of all kinds, net tons.....	1,374,166	1,848,037	1,127,265
	6,767,120	8,673,481	6,409,086

Total number of vessel passages to July 1, 1901, was 5,300 and the registered tonnage 6,055,909.

The Holland Torpedo Boat Co. has notified the William R. Trigg Co., Richmond, Va., that they can do nothing with the submarine boat Plunger. She will be towed to New York and an effort made by the Holland company to equip her with electricity as a motive power. The sum of \$90,000 advanced by the government has been refunded.

DEVELOPMENT OF COLONIAL TRADE.

Mr. O. P. Austin, chief of the treasury bureau of statistics, has just returned from a brief visit to London, Paris, Berlin, Amsterdam and Brussels, where he went for the purpose of making some statistical studies regarding the commerce of European countries and especially their commerce with, and their development of, their colonies.

"I was greatly impressed," said Mr. Austin, "with the interest evinced in colonial questions at all the capitols which I have visited. Each of these five countries has its colonial department or division, with a thoroughly equipped force largely made up of men who have had long experience in the colonies of the countries. In England, the colonial office at the home government interchanges, at intervals, its employees, as far as practicable, with the colony, thus obtaining practical and experienced men in the home office, and keeping a corps of men in training in the colonies. At the Netherlands, whose colonial work is a matter of pride on the part of every citizen of that country, the head of the colonial department has had long experience in Java, the principal Netherlands colony, and one which has been eminently successful. In France, the colonial department is extremely active, obtaining large numbers of reports from its colonial officers and distributing information by a specially organized bureau for that purpose, and in Germany and Belgium equal interest was manifested.

"Everywhere I found great public interest in colonial matters outside of official circles. In London, for instance, there is a colonial institute, composed of several hundred ex-officials of the colonies and others interested in colonial matters, which has a library of nearly 50,000 volumes and which is in close working relation with the library of the colonial department, also containing 50,000 volumes. The members of the institute hold monthly meetings for the discussion of matters pertaining to the management, commerce, statistics, and prosperity of the colonies and their commercial relations with the mother country. At Paris there is a colonial organization with about 5,000 members, some of whom have had experience in the colonies, others are merchants and business men desiring to keep in constant touch with business conditions and opportunities in the colonies and still others who are students of colonial subjects from an economic standpoint. In Germany, although their colonial system is young as compared with those of England, Netherlands or France, the colonial association numbers over 20,000 members, scattered throughout the empire, some of whom are officers and ex-officials, others connected with the army and navy, and many others who are interested in the commercial and agricultural development of the colonies.

"The study of colonial conditions and development of the colonies, both as to products and commerce, is encouraged by all the governments which control territory of this character. The French government maintains an educational institution devoted exclusively to colonial studies and the training of men for the colonial service; admission to its classes is obtained through competitive examinations, the term of study is three years, and the instructors are men of high standing both in colonial experience and in the study of economics. While the primary object of this institution is to educate men for the colonial service, those who prefer at the end of their term to devote their efforts to the commercial and agricultural development of the colonies may do so. The Netherlands government also maintains a training school, similar in general character, and the English government has a somewhat similar system for the training of men for service in India and the colonies.

"In nearly all of the countries in question there are excellent and interesting colonial museums, devoted to the exhibition of not only the products of the colonies, but also the articles required by their population, and in many cases they are accompanied by admirable statistical statements showing the growth in production of the principal articles, and the growth in exports from, and imports into, the colonies. Each of the governments maintains a statistical service by which the commerce of the colonies is carefully studied and the share which the mother country supplies of the imports, or receives of the exports, carefully tabulated, the receipts and expenditures of the colonies and of the home government on account of them recorded, and the growth of agricultural, commercial and educational conditions noted.

"Especial attention is given in all cases to the ability of the colony to meet the commercial wants of the mother country. Countries which do not produce within their own borders the foodstuffs and raw materials required by their population encourage the production in the colonies of the articles thus required at home, while the countries which produce their own foodstuffs or raw materials look to the colonies for the tropical products which they cannot produce at home and encourage the production of those articles in the colonies and their distribution in the mother country. The investment of home capital in the colonies is thus encouraged through the assurance given that the products of those colonies will find a ready market in the mother country; the manufacturers and producers of the mother country are, in turn, assured of an enlarged market in the colonies through the increased consuming power which accompanies their increased production and sales, and the general prosperity of the colonies through increased production, larger markets and better roads, railways and improved educational facilities, is thus assured."

Quite a few changes among draftsmen in the navy department have been made since Rear Admiral Francis T. Bowles was made chief constructor. Friends of Mr. Gilbert Kirby, who was with the Globe Iron Works Co. of Cleveland some years ago, will be pleased to learn that he now occupies the position of chief draftsman under Rear Admiral Bowles.

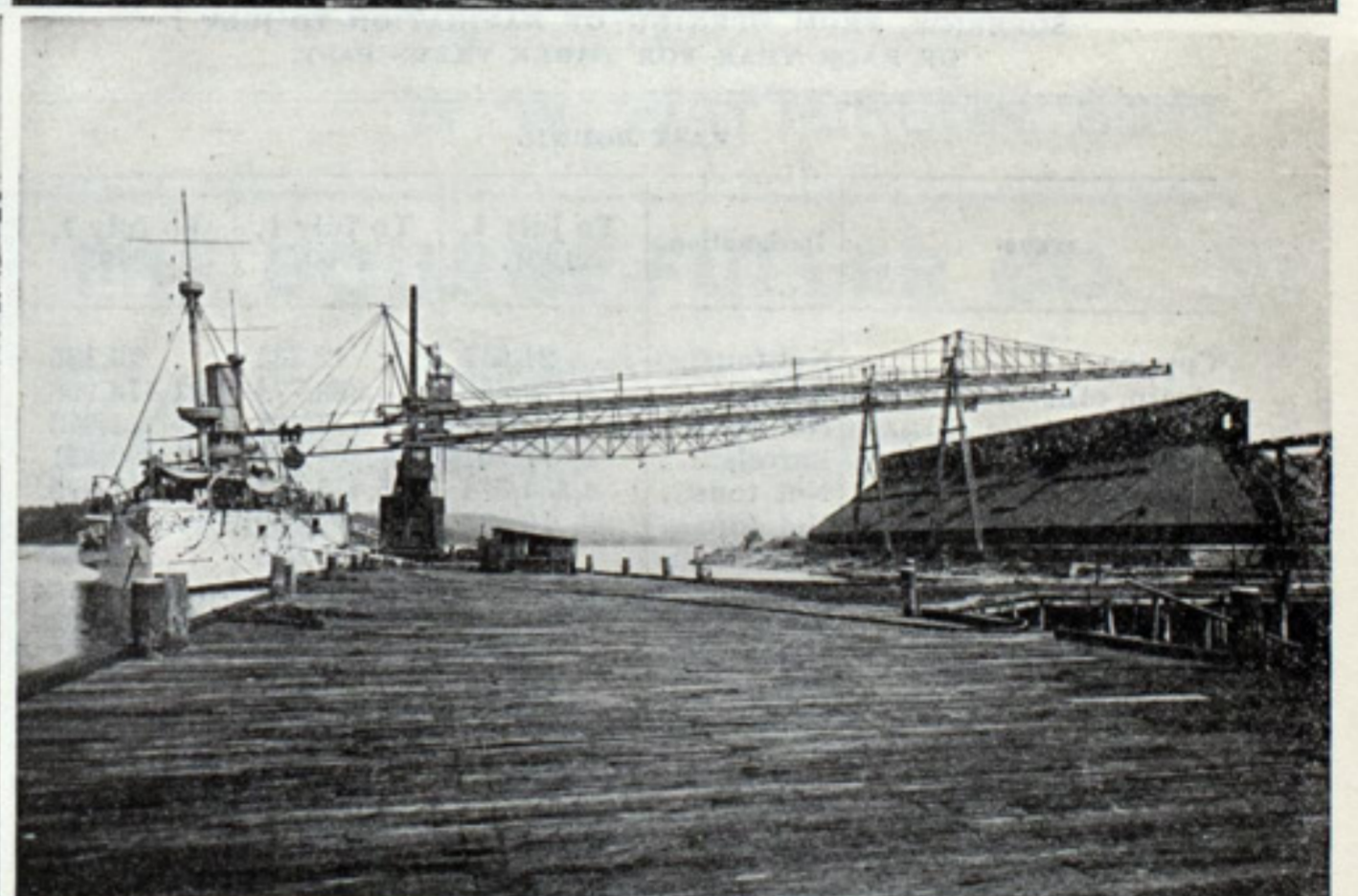
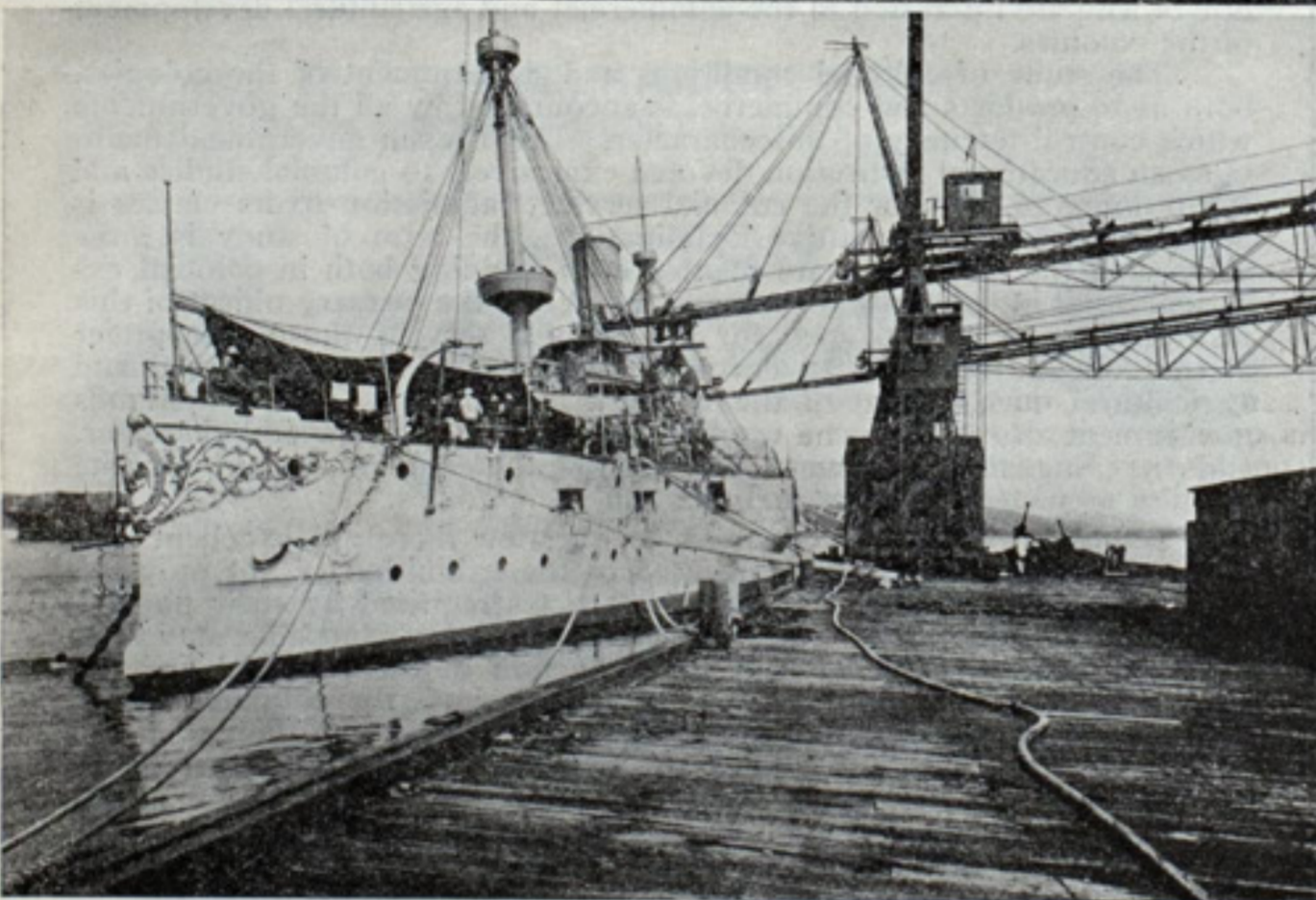
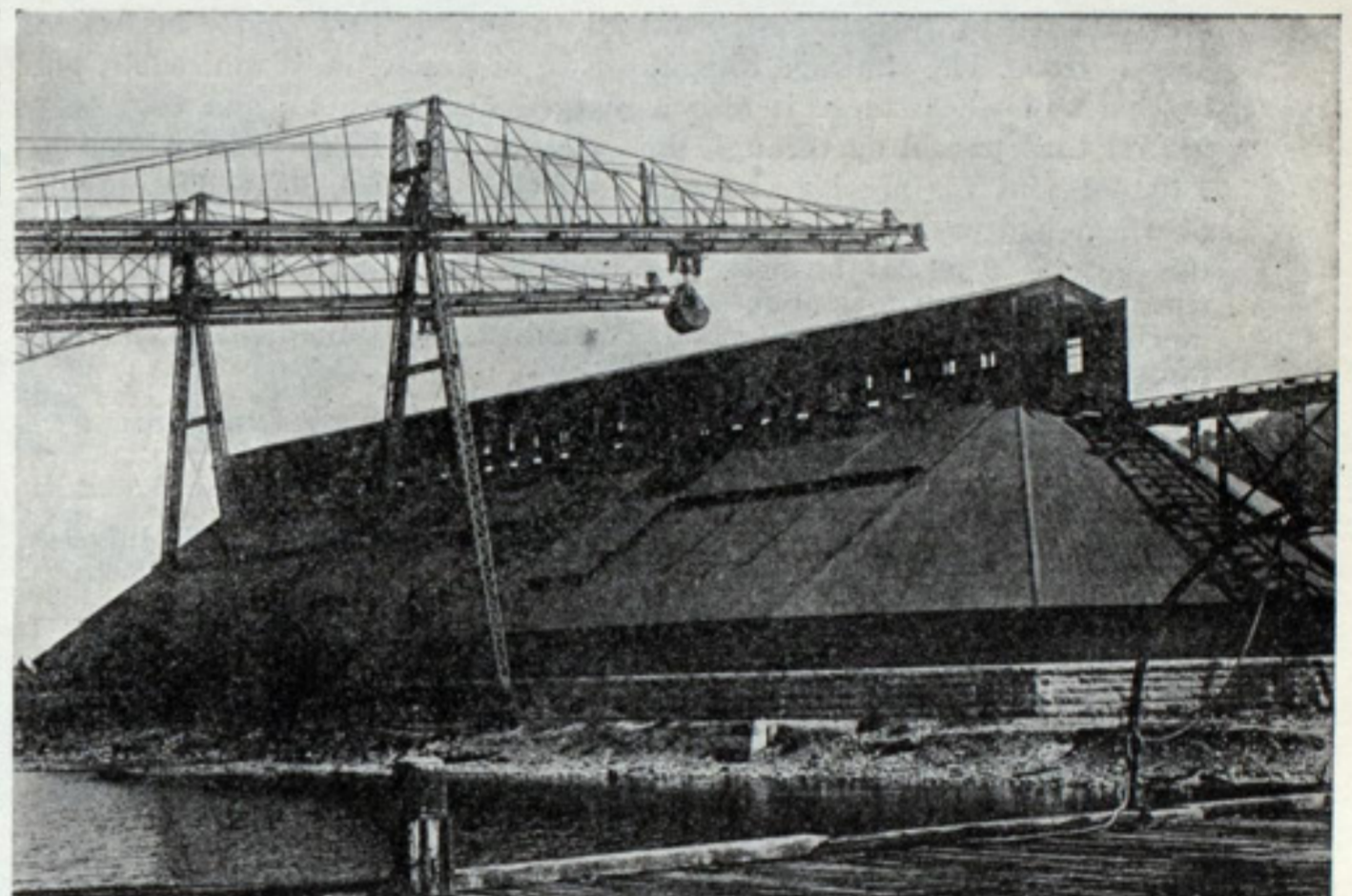
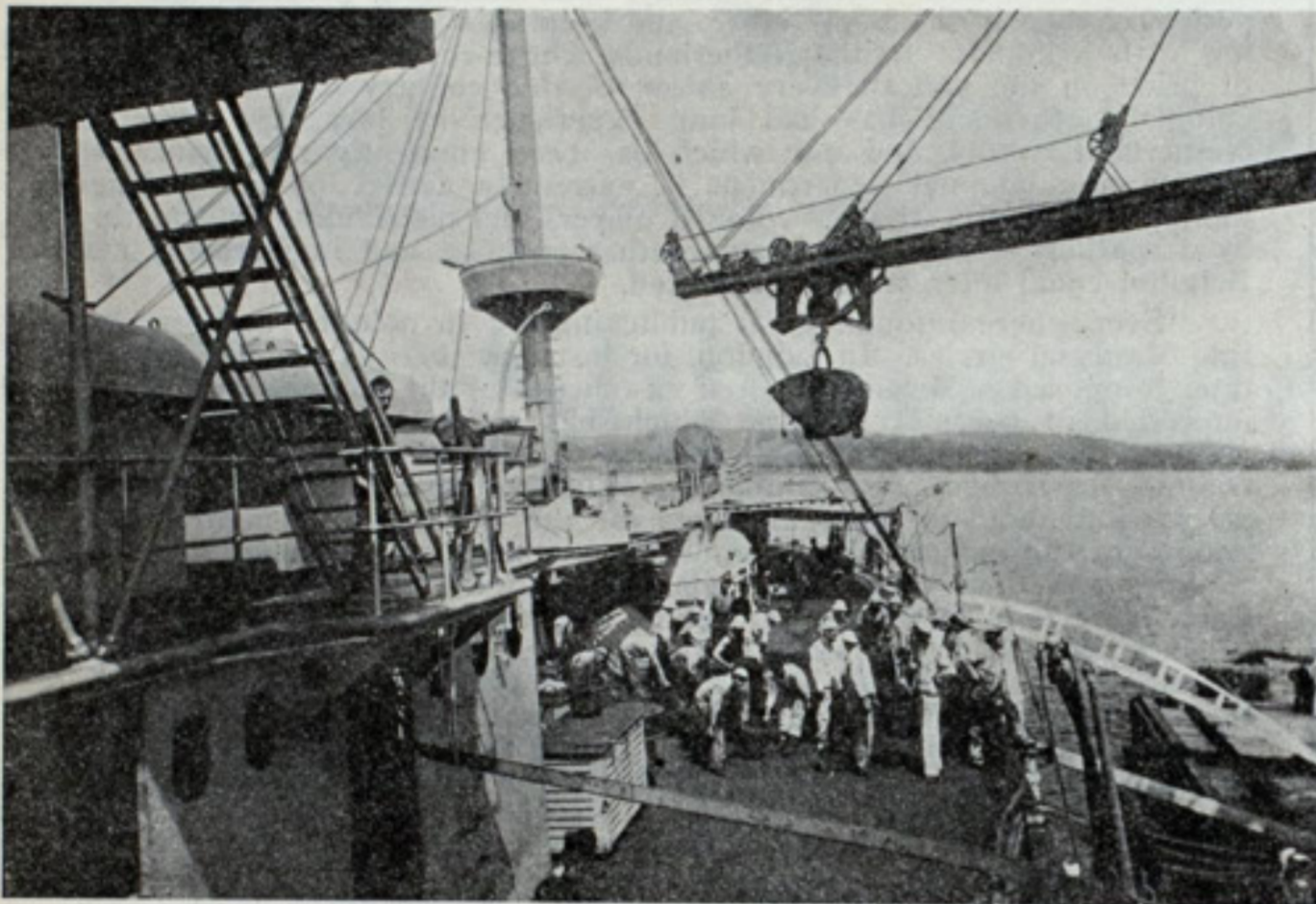
Rear Admiral Norman H. Farquhar, accompanied by Com. Walter Dunlap, is making a tour of the lakes.

THE CRAMP-VICKERS-BETHLEHEM STEEL COMBINE.

The examination into the condition of the Bethlehem Steel Co. and the Cramps which has been conducted on behalf of Vickers Sons & Maxim of London has been practically completed and reports which are said to be satisfactory have been submitted to the prospective purchasers. It is learned that the 160,000 shares of Bethlehem Steel stock held by C. M. Schwab has been handed over to Kuhn, Loeb & Co. and the Morton Trust Co., the financial representatives of the English syndicate. The remaining 140,000 shares will be turned over to Vickers Sons & Maxim at \$24, the price at which Mr. Schwab disposed of his holdings. It is understood that if the general offer to the stockholders, extended to Aug. 20, is accepted, the option of the 160,000 shares at \$24 will be exercised, not by Mr. Schwab, but by the Vickers Sons & Maxim people. If this is true there will be only a small margin of profit in the transaction for Mr. Schwab. The consolidation of the Maxim-Cramp ship building companies has been under consideration since the first of last year, and it is claimed that the only reason it has not been perfected is that the parties in interest were unable to secure an American armor plate manufacturing concern. Negotiations were first begun with the Midvale Steel Co., but were declared off, owing to a disagreement over the price of stock. Negotiations were then taken up with the Bethlehem Steel Co.

RECRUITING FOR THE NAVY.

Rear Admiral Crowninshield, chief of the bureau of navigation, is making every endeavor to meet the requirements of the navy in furnishing complements for all the vessels in commission. At the close of the Spanish war, when all men who enlisted for the war with Spain were discharged, it was necessary to find some means of getting more men, and as the seacoast cities, where men up to this time were obtained, did not furnish them, Admiral Crowninshield inaugurated the plan of sending recruiting parties for the navy through the interior states to enlist young men between eighteen and twenty-five years of age, to be trained for the navy in the rudiments of a seaman's duties. The first of these men were transferred to San Francisco, where they went on board the Hartford, made famous by Farragut, which had been rebuilt and fitted especially with a view of training these young men. Three hundred of them made the passage from San Francisco to Hampton Roads, occupying 142 days, and forty-seven came out full-fledged seamen, 200 ordinary seamen and the balance landsmen, excepting eight, who were discharged for inaptitude for the service. This proved so successful that other vessels were added from time to time to the training fleet, and now the Hartford, Lancaster, Buffalo, Dixie, Alliance and Mohican are assigned to this duty. There are two recruiting parties doing the south at present, one



Views of United States Naval Coaling Station at New London, Conn.—Battleship Texas taking on Coal.

This coaling station was designed and the machinery furnished by the Brown Hoisting Machinery Co., Cleveland, O.

On two occasions it has been officially announced that the deal for control of this plant was off, but now everything points to the ultimate success of the plan. One of the main objects of the consolidation is to turn out a war vessel equipped from keel to turret with all the mechanism of modern warfare. Vickers Sons & Maxim shareholders have approved the proposal for an additional issue of \$5,000,000 in ordinary shares, but whether or not this new issue of stock has any connection with the plan of merger can not be ascertained.

A Washington dispatch announces that Secretary Long is desirous of increasing the amount of armor which is being furnished by the armor contractors, and as the quantities supplied at present are not in keeping with the large amount under contract the contractors will be required to increase their facilities so that more speedy returns may be secured by the government. It is understood that the Carnegie Steel Co. will not undertake any considerable extensions to its armor plant at Homestead unless the government makes provision for taking a considerably larger tonnage than it has done heretofore. The present capacity is 6,000 tons per annum while the government orders average 2,500, so that if it were not for foreign orders the mills would be idle part of the time.

by land from Port Royal, which will visit the cities of Columbia, Greenville and Spartanburg, S. C.; Augusta, Charlotte, Greensboro, Durham and Harrisburg, N. C., and Atlanta, Ga. The other will proceed by water from Norfolk this week through the canals and sounds of North Carolina. This party will be on board the Alvarado, one of the gunboats captured from Spain, commanded by Lieut. W. T. Cluverius, and will visit all of the principal cities along the sounds as well as the byways and smaller settlements. The Alvarado will go first to Newberne, N. C., where a recruiting headquarters will be established.

Tuesday of last week was a great day at the Bath Iron Works, Bath, Me., because for the first time in the history of ship building in the United States has a government warship had her propellers standardized and her trial trip held on the same day. The torpedo boat Biddle, which was launched May 18, did the act. The boat, after the work of standardizing was finished, put into Mouse island to coal and at noon started out on her trial trip. She easily did 28.6 knots and was not pushed. The Bath Iron Works has the distinction of being the first firm to finish contracts let in 1898. This is the fifth torpedo boat built at the works.

Photos copyrighted, 1900, by the Brown Hoisting Machinery Co.

BRITISH NAVAL STATION IN NEWFOUNDLAND.

A dispatch from Quebec announces that information has been received there that Great Britain has fully decided to establish a naval station in Newfoundland. The third class cruiser Calypso, 2,770 tons, has been selected by the admiralty for special service as a stationary drill ship and will be stationed in Placentia bay on the south side of the island at a place called Marquise. If the dispatch which follows is to be credited the British government is making great preparations for the protection of commerce in the North Atlantic:

The gradual conversion of Marquise into a great naval stronghold is only a matter of time and money. The place is destined to become the rendezvous for a large British squadron and the new scheme of imperial defence provides a liberal estimate for its maintenance. A graving dock for the repair of warships will be built, a force of artificers will be stationed there and while the machine shops in St. Johns will probably suffice for present purposes, the erection of others at Marquise must follow before long, and the establishment of such a plant would necessitate the port being garrisoned. It will serve another important purpose in that it will be made a coaling station. At present there is no fortified fort save Halifax in the British Atlantic provinces and there immense stocks are stored. Sydney, it is true, is the place where the coal is mined and there it is easy to procure stocks in summer; but for the winter months it is icebound. Placentia bay contains many splendid harbors and is never blocked with ice floes. Marquise is situated on a splendid haven, forming part of Placentia sound and enclosed between beetling hills, which rise steeply on every side. There is ample area to accommodate a large fleet and a narrow channel which could easily be defended against hostile cruisers by a submarine torpedo scheme. It is capable of being converted into a magnificent naval stronghold, where a squadron could ride and merchant steamers seek protection. It lies almost on the railway line, which connects with every part of the island.

The strategic importance of the new station is illustrated by the fact that the bay opens out upon the Grand Banks of Newfoundland and thence upon the North Atlantic. The squadron stationed there could dominate a vast sweep of ocean, and control the waterborne commerce of Canada by way of the St. Lawrence to the westward. In fact the present scheme includes a plan for the virtual policing of the North Atlantic ocean in the interest of British commerce. Shipping near the British coast would obtain two days' protection from the naval scouts cruising west of Land's End. The patrol operating off Cape Race would afford another two days' safety, and would then turn freighters over to the squadron off Halifax, to guard them to their destination. The only undefended portion of the route would then be the one thousand miles of mid ocean, and big cruisers of the Powerful type would assist considerably in reducing the dangers associated with its crossing. At present there is no protection whatever for shipping on the Cape Race route, and it is admitted that a hostile cruiser or two lying off the south coast of Newfoundland could tie up indefinitely the whole shipping of Canada.

The importance to Canada as well as to England of the new naval base in Newfoundland has been brought to the attention of the dominion government as a reason why special care should be taken to avoid alienating the sympathy of the island colony and why the Canadian government should withdraw its opposition to the ratification of the Bond-Blaine convention so very much desired by the Newfoundlanders. But overshadowing all else, the establishment of the Newfoundland naval station clearly points to the possibility of early trouble between England and France, and the well determined intention of the former to capture St. Pierre and Miquelon the moment war is declared. The little group of islets known as St. Pierre lies off the mouth of Placentia bay, and is within easy striking distance of Marquise. From Marquise to the Miquelon capital is but eighty miles, and as the latter port is undefended it could make no resistance, even to a ship of the Calypso type. The capture of St. Pierre would be one of the greatest strategic features of a war between France and England, since it would deprive the former of her only base of supply for coal in North American waters, cripple her cruisers and make Britain the undisputed master in those waters. Of course the French government is not blind to the danger, and a short time ago the French flagship on the North American station visited Placentia bay, where Commodore Henrique and his staff landed at Marquise and inspected the situation of the proposed British station. They made a tour of the surrounding country and their launches sounded in the offing until they must have a good knowledge of the port. At St. Pierre, too, they have made preparations for defence. The authorities have accumulated a large stock of military munitions there, and an effort has been made to enforce conscription among the adult males and drill them as a town guard. But as they are nearly all fishermen, who for seven or eight months of the year are away on the Grand Banks, the scheme is not very successful.

The new naval reserve movement is being very well received in Newfoundland, of whose total population of 200,000, fully one-third are directly engaged in the fisheries, and of these the admiralty calculates to enroll in the reserve 5,000 young men. These fisherfolk are of a higher type of seafarers than the British naval recruits, for they learn their trade in the school of experience, constantly facing the most trying conditions of weather and coast line. The most liberal terms have been offered to fishermen to induce them to join the reserve, and as an additional incentive it has been arranged that their drills shall take place in winter, so as not to interfere with the regular fishing operations of the summer. Newfoundland is the only colony to which the naval reserve has been extended. The admiralty objected to Canada's being included, because there was too great an intercourse between the maritime provinces and the eastern states, and there was the greatest danger that the Canadian reservists as soon as trained would cross the border and avail themselves of the better terms which Uncle Sam offers for men to crew his warships. The increased strategic importance given to Newfoundland by this movement causes great satisfaction in the island, where it is hoped that it may prove a powerful lever to secure for the population that consideration which has so long been withheld by the imperial authorities, as well in the French shore difficulty and the Bond-Blaine convention matter, as in many other affairs.

As soon as the steel ship William P. Frye is off the stocks the firm of Arthur Sewall & Co., Bath, Me., will build a four-masted steel schooner 250 ft. long.

EUROPEAN STATION RE-ESTABLISHED.

Formal orders have been issued by the navy department re-establishing the European station with Rear Admiral J. B. Cromwell in command. Admiral Cromwell is now at Rio and has acknowledged receipt of the order. He will designate the headquarters of the squadron which will probably be at some point in the Mediterranean. The re-establishment of the European station is said to be entirely devoid of political significance, and to be simply a move in the regular procedure of the navy to place the service in the same condition that it was prior to the war. The cruiser Chicago is ordered to proceed from Rio and will be the flagship of the admiral. The Albany and Nashville sailed for Cavite June 3, from Singapore, en route to the European station. It is expected that the rendezvous of the ships at the time they assemble will be Gibraltar. The European station, although marked on the naval maps, has not been in actual existence since just before the breaking out of the Spanish war. Prior to that time several ships had been in the Mediterranean, and the San Francisco and the Bancroft made a hurried departure from those waters to avoid the complications likely to ensue when war was declared. The limits of the station are Port Said, at the entrance of the Red sea, on the east, and a line running north and south through the Atlantic from the southernmost point of Greenland to Para on the north coast of Brazil, and thence eastward. This includes the Azores and all of the waters of Europe and North Africa. Admiral Cromwell has been until now commander-in-chief of the South Atlantic station, and his new assignment creates a vacancy which will be filled for the present by Capt. Pendleton of the Atlanta, now at Rio. If additional ships are sent to the South Atlantic later, a rear admiral probably will be named for the command, but for the present there is no purpose of increasing the ships on that station. Neither is there any present prospect of adding to the ships on the European station.

JUNIOR OFFICERS BADLY NEEDED IN THE NAVY.

The semi-annual edition of the Naval Register bearing date of July 1, but which had been delayed in publication through the failure of the board of rear admirals to report the names of the two lieutenants they have selected for retirement, shows that there have been twenty-six resignations, twenty-three retirements and thirty deaths of officers of the navy and marine corps since Jan. 1. One naval cadet was dismissed, but subsequently pardoned. There are twenty-one rear admirals, of whom three are "extra members," promoted for war service, whose retirement, etc., will not create vacancies; seventy regular and three extra captains, 112 regular and three extra commanders, 170 regular and two extra lieutenant-commanders, 300 regular and four extra lieutenants and 104 junior lieutenants.

The Register shows that there is a serious shortage in the number of ensigns. The law authorizes 245, but the list contains only 126. There has been much complaint over the lack of watch and division officers for warships, but although Secretary Long has frequently urged on congress the necessity of authorizing an increase in the number of naval cadets and shortening the course of instruction in order to provide enough junior officers, his efforts have been unavailing. The fact that 119 vacancies exist among the ensigns at a time when there are more vessels in commission than ever before, except in war time, will be brought to the attention of congress as an argument in favor of increasing the number of naval cadets.

F. H. CLERGUE'S FAITH IN CANADA.

Mr. F. H. Clergue of Sault Ste. Marie, Ont., in speaking of the undeveloped resources of new Ontario in conversation lately with a representative of an Ottawa paper, said:

"I firmly believe that Canada will be a great country, and that before many years. Canada is full from end to end of natural wealth. The fact is only becoming known to the world. What will happen is this: Very soon the opportunities of Americans for profitable home investment will come to an end. A general turn of eyes toward Canada will take place. Capital will flow in and the capital will be followed by population. Just as Canadians went to the United States years ago to better themselves, so Americans will come to Canada. American capital will be followed by British capital and more or less British immigration. Once the country gets a start the rest will be easy." Mr. Clergue went on to say that Canadians have been accused of being "slow," but in his opinion it was not true. Canadians were just as alive to opportunities as Americans. The trouble has been that Canadians had lacked capital. Canadians, Mr. Clergue believed, had the making of a magnificent nation; physique, hardiness, cleanliness of tone, energy, all the desirable qualities were there. When Canada becomes a nation, he said it will be a great nation. A year ago, the population of the Canadian Soo was 4,000. It is now 7,000. Mr. Clergue says he expects it will be 50,000 within three years. It will be a great manufacturing center. When in full operation the steel plant alone will employ over 10,000 men, and why, he asks, shouldn't it be a great center? "Within easy distance there are in sight vast quantities of iron, nickel, copper and pulpwood. The water power is unlimited. Lake Superior is our mill pond, and the St. Mary's river our flume. Our shipping facilities, both by rail and water, are unsurpassed anywhere."

Steel corporation stocks sagged a bit last week when the dividends were declared, but this was due to the fact that the directors in fixing the rate for the first dividend did not specify that the dividends were regular quarterly ones. The definite announcement by Judge Gary on Friday last that the dividends were regular quarterly ones settled the matter and gave tone to the stock. The announcement was really not necessary because no one acquainted with the directors of this company would believe that a distribution of profits would be decided upon unless they knew that they could continue them. It is understood that the dividend question was only considered after a very large sum had been charged off to depreciation and a settled policy inaugurated of maintaining a permanent sinking fund for this purpose.

The navy department has been advised that the Cramps of Philadelphia have a claim of about \$264,000 against the government for delay incident to furnishing armor for the battleship Alabama. The Alabama was begun in December, 1896, and under the three-years' contract should have been completed in December, 1899. Other claims may also be filed.

HISTORY OF THE FAMOUS DISPATCH TO DEWEY.

Rear Admiral A. S. Crowninshield, chief of the bureau of navigation, has added another and by far the most interesting chapter to the discussion over the authorship of the famous order to Admiral Dewey to capture or destroy the Spanish ships in the Philippines. Secretary Long, who resumed his official duties at the navy department Monday morning, had something to say on the subject also. A circumstantial account of how the dispatch came to be written was given by Admiral Crowninshield, who said that he wrote it at the white house after a message had come from Admiral Dewey notifying the department that he had been ordered to leave Hong Kong within forty-eight hours and asking for instructions.

Secretary Long was surprised at the interest that had been aroused over his informal remarks at the outing of the Massachusetts club at Nantucket last week, in which he referred to the order to Dewey as the work probably of some unknown subordinate clerk in the navy department. He and Rear Admiral Crowninshield talked over the dispatch to Dewey Monday morning last and in the course of the conversation it came out that the secretary's recollection of what transpired in connection with the dispatch was that it had been prepared in the bureau of navigation and was taken to the white house by Mr. Long, who, having obtained the president's approval, sent it to the bureau of navigation to be put into cipher. Admiral Crowninshield, however, recalled distinctly that he wrote the order at the white house while Mr. Long was out driving. There is no controversy between Secretary Long and Admiral Crowninshield on the subject. In fact, each disclaims personal interest in the matter beyond that which comes from participation in the preparation of a communication that was the first step in bringing the Philippines under American control.

"I never regarded the writing of this dispatch as a matter of any particular importance," said Admiral Crowninshield, "nor have I ever taken to myself any credit for it, except that I have always regarded it as an interesting thing to have done. The secretary of the navy, who signed the dispatch, and the president of the United States, who directed its preparation, are the ones who accepted the responsibility for the order that was given to Commodore Dewey, and they are, therefore, entitled, in my opinion, to whatever credit that comes from having given such an important and historical order."

Admiral Crowninshield, after consulting Secretary Long, dictated the following statement of his recollection of the circumstances attending the preparation of the dispatch:

"On the afternoon of Sunday, April 24, 1898, I went over with my son and his cousin to the Arlington golf links to see them play a round of golf. About the time they had finished I noticed the secretary of the navy and Mrs. Long driving up the road passing the golf links, and I walked over to their carriage and had a short conversation with the secretary, who informed me that he was going out in the country to spend the day. Soon after I returned to my home in Washington, where I was informed that Lieut. H. H. Whittlesey, an officer on duty in the bureau of navigation, had called to see me during my absence with an important dispatch. A short time after, Lieut. Whittlesey again called with the dispatch in question, which was from Admiral Dewey to the secretary of the navy, stating the governor of Hong Kong had notified him that he must leave that port with the force under his command within forty-eight hours. Deeming that it was of the greatest importance that a reply should be sent as soon as possible to Admiral Dewey, I took the dispatch to the white house and laid it before the president.

"The president suggested that the preparing of a reply should be put off until the secretary returned to the city; but I urged upon the president the importance of sending a dispatch to Admiral Dewey, who was undoubtedly anxiously awaiting instructions. I also informed the president that a part of a day had elapsed since Admiral Dewey had received the notice from the governor of Hong Kong, and that it was, at the moment we were talking, already Monday morning in Hong Kong. The president then directed me to go and find Mr. Long, the secretary of the navy, and Judge Day, the secretary of state, and bring them to the white house. I procured a cab and drove to the Portland, the residence of Secretary Long, where I was informed that he was still absent and was not expected back until later in the day. I then drove to the residence of Secretary Day, who I found at home and to whom I delivered the president's message. Secretary Day got into the carriage with me and we drove to the white house, stopping en route at the residence of Assistant Secretary of State Adee, where we were informed that the latter was at the state department. Upon arriving at the white house Secretary Day requested that I should go to the navy department and remain near the telephone, as he would probably send for me in fifteen or twenty minutes. I proceeded to the navy department and in a short time received a telephone message from the white house to come there. Upon arriving at the white house I was shown to the western end of the upper corridor, where the president was sitting with the following persons: Secretary Day, Attorney-General Griggs, Senator Hale, and one other, possibly Secretary Bliss, though I am not sure. The late Senator Davis joined the party later.

"A discussion of the dispatch from Admiral Dewey and the reply which was to be sent to him was taking place when I arrived and in which I took part for several minutes. The president then turned to Attorney-General Griggs and said: 'Griggs, you write a dispatch for Dewey to proceed to Manila and attack the Spanish naval force assembled there,' whereupon Attorney-General Griggs turned to me and said, 'Captain, you know how to write that better than I do; you go and write it. You will find some blanks in the cabinet room.' I at once proceeded to the cabinet room, where I met Mr. Hayes, son of ex-President Hayes, who was visiting at the white house. He got me some blanks and a pencil and I sat down and wrote the dispatch as sent to Admiral Dewey. Returning to the presidential party, I handed the dispatch I had prepared to Attorney-General Griggs, who, after reading it over, said it was satisfactory and handed it to the president, who read it aloud. The only change that was made in the dispatch as I wrote it was the addition of either the word 'capture' or the word 'destroy.' The dispatch as originally written by me contained but one of these words, but which one I don't recall. With this change the president approved of the dispatch and returned it to me with the remark that he preferred that it should not be sent until it was seen by the secretary of the navy. I then said to the president I would take the dispatch to the navy department and have it put in cipher ready for the secretary's signature on his return to the city. I then went

over to the navy department, handed the dispatch to Lieut. Whittlesey and directed him to go ahead and put it into cipher and to take it to the Portland as soon as the secretary returned, for his signature. Lieut. Whittlesey reported to me the same evening that the secretary had signed the dispatch and that it had been sent. One week after that Sunday Admiral Dewey arrived at Manila and attacked and destroyed the Spanish fleet there."

Secretary Long on referring to the subject said that his recollection was very distinct. "Immediately upon the declaration of war," he said, "I had conferred with the president about an order to Dewey to attack the Spanish fleet at Manila. On Sunday morning, April 24, I went to the white house, sat with the president on a sofa in the corridor and earnestly advised the sending of such an order. But for Admiral Crowninshield's statement, I should have said unhesitatingly that I had with me the dispatch which had been prepared in the bureau of navigation and that, the president approving, I returned to the navy department and sent it in to the bureau of navigation to be put in cipher. I then went out to drive. As I drove out between 11 and 12 o'clock, I remember passing Admiral Crowninshield. As to what transpired later at the white house, at the meeting which he described, I of course have no knowledge. It seems to me probable that the president, after his interview with me, sent for some of the cabinet and Admiral Crowninshield and took up the dispatch which, according to my recollection, had already been prepared and gave it final consideration. Probably, also, there had then come in Dewey's dispatch of the day before, advising us that he had been ordered to get away from Hong Kong."

One of the strangest things in the whole discussion is that nobody concerned, except Admiral Crowninshield, had a distinct recollection of any dispatch from Admiral Dewey received on April 24, 1898, saying that he had been requested by the governor of Hong Kong to leave that port within forty-eight hours and asking for instructions. Secretary Long could not recall any such message, and he looked for it in vain today in the printed volume of war dispatches, entitled "Appendix to the Report of the Chief of the Bureau of Navigation." A search of the official files was made, however, and the original of the dispatch to which Admiral Crowninshield refers in his statement was discovered. Through an oversight it was not included in the "Appendix" and has never been printed. It is dated Hong Kong, April 23, 1898, signed Dewey, and is as follows:

"The governor of Hong Kong, by direction of the secretary of the states for the colonies, has notified me that a war between the United States and Spain exists. He requests ships to leave within forty-eight hours. The instructions of the department are requested in regard to it."

URGING PROTECTION FOR CANADIAN BUILDERS.

Capt. Alexander McDougall of whaleback fame has been inclined to urge measures of protection for the Canadian ship building industry since he became interested in the Collingwood Ship Building Co. of Collingwood, Ont. He is thus quoted in a recent interview:

"Steel ship building in Canada cannot be a success until some protection is given against the evils now existing. In the United States, where there is cheap steel, many ship building yards, encouraged by protection, are now selling ships that engage, through round about methods of evading the dominion coasting laws, in the Canadian coasting trade, while congress has forbidden Canadian or any ships save those built in the United States to trade coastwise in United States waters. The only condition upon which a foreign vessel can come under the United States flag is by special act of congress, or when it is wrecked on the coast of the United States and is repaired in the United States at a cost of more than three-quarters of the value. If a United States vessel is repaired in Canada, she must pay 50 per cent. of the cost as customs duty at the first United States port she enters. Thus American ship yards have protection for both building and repairing ships, while Canadians have little or no ship protection. The Canadian coastwise trade is freely open to all British ships, and British ship registers are open to all foreign-built ships, so that when a ship is wanted in Canada it can be bought in the United States, with all its appurtenances, which belong to many branches of trade, and by a little red tape can be enrolled under British registry and hail from some British port by putting its name on her stern and buying a British flag. A Canadian vessel can get repairs in a United States port and pay but little customs charges for such repairs. The United States government further protect their Pacific coast ship yards by allowing a large percentage in favor of Pacific coast ship yards when tendering for government work, and at present there are United States government ships under contract at San Francisco and Seattle at prices from \$100,000 to \$200,000 more than they could be built for on the Atlantic coast. In Canada, when government ships are wanted, bids are asked for in Canada and also in Great Britain; the details of their specifications and fittings are of a class such as can only be got in Great Britain, and the Canadian ship builder would have to pay duty on these parts. Unless the Canadian is the lowest bidder the contract is let to an outsider, who can get the ship built in Great Britain, Germany, the United States or elsewhere. Thus an industry which, with its great quantity of raw material, Canada is peculiarly fitted for, is hampered, and the heavy traffic along the frontier is carried by ships not made in the dominion. If some restriction were laid upon British ships and foreign-built ships of English register engaging in Canadian coastwise trade; if the Canadian government would pay a small bounty on all steel ships built in Canada and if an increased custom duty was charged on repairs to Canadian ships in foreign parts, steel ship building in the dominion would be so stimulated that in the near future steel ships might be sold with their cargoes in foreign countries, as formerly wooden ships, built in Quebec, were sold all over the earth."

The Cramp Steel Co., Ltd., Collingwood, Ont., are calling for subscriptions to one issue of \$1,000,000 7 per cent. cumulative preferred stock, the entire capital being \$2,000,000 of preferred stock and \$3,000,000 of common stock. Subscribers to the preferred receive as a bonus one share of common stock. The proceeds of the sale of the preferred stock are to be used to build a blast furnace and an open hearth steel plant at Collingwood, Ont., the town having granted a cash bonus of \$115,000 and eighty acres of land. The company owns iron lands in Ontario, which are said to carry Bessemer ore, and also coal mines in Wise and Dickenson counties, Virginia. It is estimated in the advertisement soliciting stock subscriptions that the bounties during their existence will aggregate \$1,755,000.

DEATH OF WM. E. FITZGERALD.

In the death of Wm. E. Fitzgerald, due to an explosion of gas at his summer home near Milwaukee on Saturday night last, the American Ship Building Co. has lost one of the most progressive and energetic members of its executive staff. A typical, driving young business man of strong personality and rare executive ability—one of the kind who have been playing an important part in the upbuilding of American industrial organizations that have startled the world—has suddenly been

cut off in an unusually promising career. Had he lived, "Will" Fitzgerald, as he was familiarly known to a wide circle of friends, would certainly have risen to a position pre-eminent in the great industrial center bordering on the lakes.

The manner in which Mr. Fitzgerald met death caused a profound shock throughout the lake region. At his summer home on Lake Nagsawick, near Milwaukee, gas is generated in the basement. Noting a defect in the lights upon retiring Saturday night, he concluded that there was something wrong with the generator, and after finding the odor of gas in the lower part of the house summoned his coachman, Wm. Gruenewald, to go with him to the basement. The coachman was fully dressed, but Mr. Fitzgerald did not wait to do more than slip on his trousers over a night shirt. The coachman had picked up a lighted candle and both men thought of the danger of taking a light into the basement, but Mr. Fitzgerald, who



WM. E. FITZGERALD.

entered first, evidently concluded that as he had waited a while with the cellar door open the gas had so mingled with the air that the danger had passed. He called to the coachman to enter but not go close to the generator. The explosion occurred before the man with the light had fully descended the short stairway. Gruenewald was pretty well protected by his clothing and was only burned about the head and hands, but before Mr. Fitzgerald could reach the stairway he was very badly burned from the waist up. Mrs. Fitzgerald did heroic work in endeavoring to rescue her husband. Help was summoned and everything was done for Mr. Fitzgerald, but he lapsed into a state of unconsciousness and died at noon on Sunday. He leaves a wife and two boys, the latter aged fourteen and eight years. Of a family of eleven boys and girls, all children of the late John Fitzgerald of Milwaukee, only one, Mrs. Franklin Ward Smith, now survives.

John Fitzgerald was one of the pioneers in dry dock business at Milwaukee. The son, Wm. E., was taken into the business shortly after leaving school, and when his father's interests were some time later consolidated with the Wolf & Davidson ship yards under the name Milwaukee Dry Dock Co., his ability was recognized. His advancement was rapid just before and after his father's death, and when the consolidation of lake ship yards was taken up, a little more than two years ago, he was in position to make terms for the Milwaukee yards. This led to his appointment as assistant manager of the consolidated companies. This position in turn led to his connection in other enterprises—operation of vessels, insurance, etc.—with the men of large money interests who control the American Ship Building Co., and he was occupied with big things in a business way when death came so suddenly.

AROUND THE GREAT LAKES.

Mr. A. C. Heron, surveyor for Lloyd's register of shipping, has opened an office in the Wade building, Cleveland, and will have charge of vessel surveying on the lakes.

The Western line steamer Harlem, which was wrecked on Isle Royale, Lake Superior, two years ago and afterward released and repaired, was sold at public sale at Port Huron, Wednesday, at \$110,000. She was bid in by the Jenks Ship Building Co.

Now it is positively announced by Barry Bros. of Chicago that they have purchased the freight and passenger steamers Empire State and Badger State from M. A. Bradley of Cleveland and will prepare them for service between Milwaukee and Chicago.

During June the Detroit marine postoffice delivered 43,454 pieces of mail matter, and received 15,340 pieces. The postoffice issued ninety-one money orders, aggregating \$2,002, and eleven registered letters were passed. There were 3,222 passages of boats during the month.

Only one bid was received at Milwaukee, Wednesday, by Capt. Warren, United States light-house inspector, for the construction of the light-house tender for which proposals were asked some time ago. The bid—\$107,750.45—was from the Jenks Ship Building Co. of Port Huron. The amount of the appropriation is \$115,000. Capt. Warren will recommend acceptance of the bid.

On Saturday of this week one of the two steel freight steamers building at Detroit for capitalists who will be represented in the management of the vessels by Mr. A. McVittie will be launched. This vessel will be ready for service early next month. She will be named Colonel. The second steamer will be launched shortly and will be ready for business about Sept. 10. The big side-wheel passenger steamers to be built by the Detroit company will be put down on berths vacated by these freighters. Lloyd's strict requirements have delayed work on the Morley steamer—Canadian canal size—building at Detroit, but when she is completed she will be a very trim craft, fit to trade to any part of the world.

Pan-American exposition rates to Buffalo via the Nickel Plate road—Tickets now on sale at all stations, one and one-third fare for round trip, good returning fifteen days. Write, wire, 'phone or call on nearest agent, or E. A. Akers, C. P. & T. A., Cleveland, Ohio. 85, Aug. 1.

NEGOTIATIONS FOR MORE NEW LAKE SHIPS.

Contracts for as many as twelve to fifteen steel freight steamers to come out next spring may be announced almost any day by the American Ship Building Co.; this in addition to orders for seven freighters which the company already has in hand for next year. Negotiations with Cleveland vessel owners for four or five steamers of the regular ore and grain kind are nearing a settlement. The other vessels for which orders are expected will be in the fleet, long talked of, for trade down the Canadian canals to Montreal. The steel freight steamer for Capt. W. C. Richardson of Cleveland, ordered a week ago and briefly referred to in the last issue of the Review, will be built at the Cleveland yard of the American company. This vessel will be 374 ft. over all, 354 ft. keel, 48 ft. beam and 28 ft. deep. She will have triple expansion engines with cylinders of 22, 35 and 58 in. diameter and 40 in. stroke. Steam will be furnished by two Scotch boilers, 14 ft. in diameter and 13 ft. long, to be allowed 170 lbs. pressure. Still another order, placed only a few days ago with the American company, is for a steel steamer that will be controlled by Capt. W. W. Brown of Cleveland. This vessel will also be of about 5,000 gross tons capacity. She will be built at South Chicago. Dimensions are: Keel length, 346 ft.; beam, 48 ft.; depth, 28 ft. Her triple expansion engines will have cylinders of 20, 33½ and 55 in. diameter, with a common stroke of 40 in. Boilers will be fitted with Howden hot draft apparatus and will be of 12 ft. diameter and 11½ ft. length.

The Bertram Engine Works of Toronto has been building, almost every year of late, a passenger steamer for the Richelieu & Ontario Navigation Co., which operates a large fleet of freight and passenger vessels on Lake Ontario and the St. Lawrence river. It has been understood for some time past that another large side-wheeler for this company would be put down at the Toronto works, and now it is announced that the plans are practically decided upon and that the vessel will be by far the best and largest of the fleet—346 ft. long.

SHORTAGE IN SHIPMENTS FAVORS LAKE FREIGHTS.

Reports as to the amount of iron ore moved by lake to July 1 as well as the canal reports from Sault Ste. Marie regarding Lake Superior commerce to the same date favor the vessel owner's side of the lake freight market, on account of the shortages which they show compared with last year. The freight market is therefore fully as strong as it was at the opening of navigation when an 80-cent ore basis from the head of Lake Superior was established, on account of evidences of a short season. On this basis, which is still firmly maintained, the vessels are making fair profits and as a result it will be noted that the ship yards are filling up with orders for another year. The canal reports from Sault Ste. Marie show that the movement of freight of all kinds to and from Lake Superior is still 2,000,000 tons behind last year. Expectations of ore shippers regarding the June movement were not realized because of delays in handling the ships, especially at Lake Erie ports. The ore shipments to July 1 foot up only 4,963,608 gross tons, as against 6,415,840 tons on the same date a year ago. The June movement aggregated 3,373,833 tons, as against hopes of a total of nearly 4,000,000 tons. In June a year ago the shipments footed up 3,149,952 tons, so that the gain in the month just closed is nothing like what was expected.

UNITED STATES STEEL EARNINGS.

Wall street had evidently discounted the action of the management of the United States Steel Corporation in beginning the payment of 7 and 4 per cent. respectively on the preferred and common shares, as the market for these stocks has been lower during the past week than it was before the dividends were announced. With its outstanding capital of \$508,486,300 of preferred and \$506,473,400 of common stock the dividend payments now decided on call for the disbursement of \$8,898,510 and \$5,064,734 respectively, or a total of \$13,963,244. The unofficial statement is that in the three months from April 1 to July 1, the first quarter of the United States Steel Corporation's existence, the aggregate net earnings of the constituent companies, after providing for the interest on the \$305,000,000 of 5 per cent. bonds and the dividend of 1¾ per cent. for the quarter on the preferred, there was a surplus indicating earnings of 10 per cent. on the common stock for the year. This agrees with another report that the actual figures of net earnings for the three months were no less than \$26,500,000, and net profits of fully \$102,000,000 for the full year ending April 1, 1902, are also said to be expected. It would, therefore, seem that whatever the future may have in store for the steel trade in the way of labor disturbances, competition or fluctuations of consumption and prices, the initial quarter of the great steel combination has been successful and profitable to a degree which justifies the inception of dividends on the basis just adopted.

SIDE-WHEEL STEAMER FOR LAKE CHAMPLAIN.

The Champlain Transportation Co., doing a general freight and passenger business on Lake Champlain, has awarded a contract for a new passenger steamer to the W. & A. Fletcher Co., Hoboken, N. J. The vessel was designed by J. W. Milliard, No. 32 Broadway, New York, and the plans call for a steel sidewheel boat 250 ft. long at the waterline and 263 ft. over all. The breadth, molded, is 35 ft., and breadth, over all, 63 ft. 6 in., while the depth at the lowest point of sheer is 11 ft. 3 in. to the base line. The engine will be of the vertical beam type with jet condenser and feathering wheels. The diameter of the cylinder is 55 in. and the stroke of piston 10 ft. There will be two return tubular boilers, 26 ft. 6 in. long, 9 ft. 6 in. diameter, 11 ft. 6 in. across the front, and carrying steam of about 50 lbs. gauge pressure. The vessel will be equipped with all modern conveniences.

A trial trip of the steamboat Thomas Patten of the Patten line for service in New York bay took place a few days ago. The hull was built by T. S. Marvel & Co., Newburgh, N. Y., the engines by the W. & A. Fletcher Co., Hoboken, N. J., and the joiner work was put on by John Englis & Son of Greenpoint. The vessel developed a speed of 18 miles on the trip. The machinery consists of a vertical, surface-condensing beam engine with a cylinder of 51 in. diameter by 8 ft. stroke. The boiler is of the lobster-back return tubular type, built for a steam pressure of 50 lbs. per square inch.

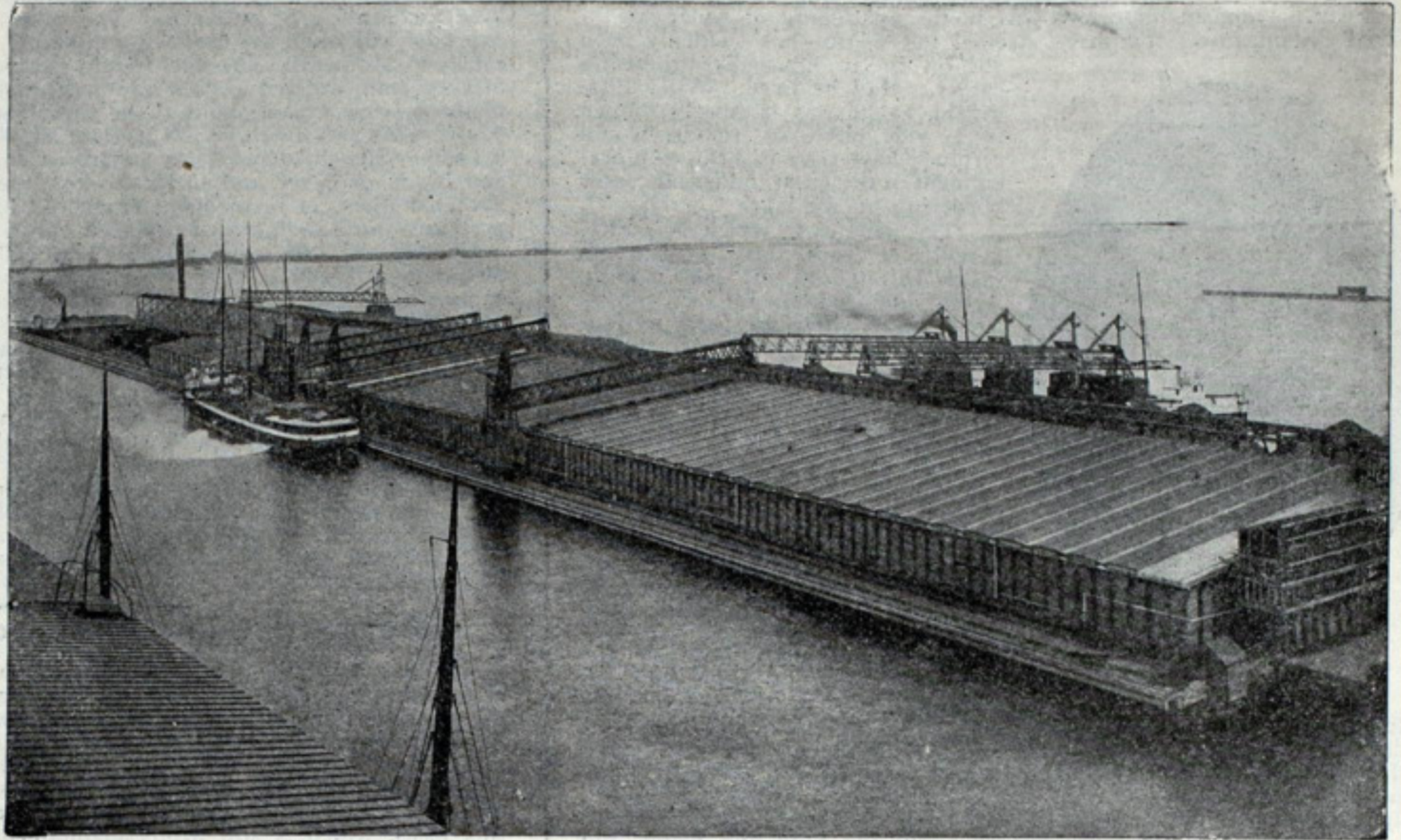
BRITISH NAVAL PROGRAM.

The British naval estimates for 1901 have just been announced in the house of commons. They comprise three battleships of a new and improved class, six cruisers of the Monmouth class and ten improved destroyers. Arnold-Forster, parliamentary secretary to the admiralty, explained that there had been for some time some anxiety as to the character of the battleships now being built. It was generally admitted that there had been considerable progress in the matter of armaments. Changes should therefore be made in the direction of increasing offensive and defensive battleships. The new battleships, he said, would be named King Edward, Commonwealth and Dominion, the names for the latter two being selected in recognition of the services of the colonies during the war. Each of the new ships would show improvements over the London and Formidable type, and some novel features would also be introduced. They would have a displacement of 16,500 tons, be 20 ft. longer than the Formidable, and have engines of 18,000 H.P., with which it was expected that they would attain a speed of 18½ knots. They would be protected by an armor belt from the lower protected deck to 9 in. above the water line, and then by another armor belt to the main deck, the latter to continue along the whole length of the ship.

A curious feature, never before introduced, would be a battery of ten 6-in. guns, which would be inclosed in 7-in. armor, which battery would be divided by traverses to diminish the effect of a shell penetrating the armor. Another peculiarity would be the addition of four 12-in. guns. There would also be four 9.2-in. guns of great power, never before introduced in the secondary armament of any first-class battleship.

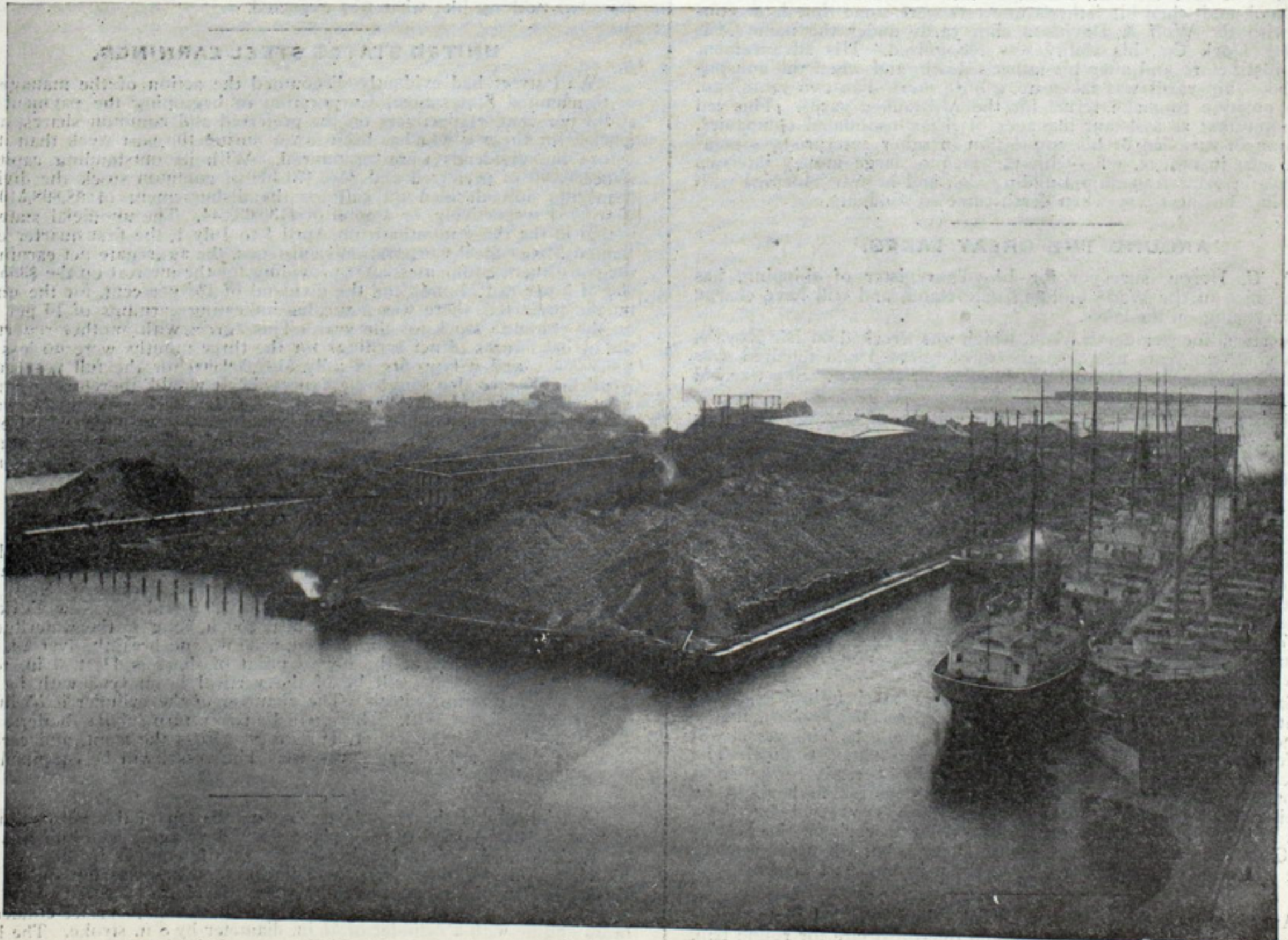
Forster added that the ten destroyers to be built would be stronger

than the present type. In regard to hospital ships, the secretary of the admiralty said Great Britain now had in the Mediterranean, through the generosity of an American citizen—Bernard N. Baker, president of the Atlantic Transport line—the well-equipped Maine. All the new ships will be fitted with wireless telegraphy, as will also all the other British warships as they come in for repairs.



OHIO COAL CO.'S DOCK AT DULUTH, MINN., A POINT AT THE HEAD OF THE GREAT LAKES FOR DISTRIBUTION OF COAL THROUGHOUT THE NORTHWEST.

Efforts are being made to overcome the arrears in ship building, and, the secretary added, the government is now able to supply guns as they are needed. The secretary of the admiralty also said there was an absolute determination upon the part of the admiralty to find the best type of boiler, and the government was watching with interest a German experiment of combining cylindrical and water tube boilers in the same ship.



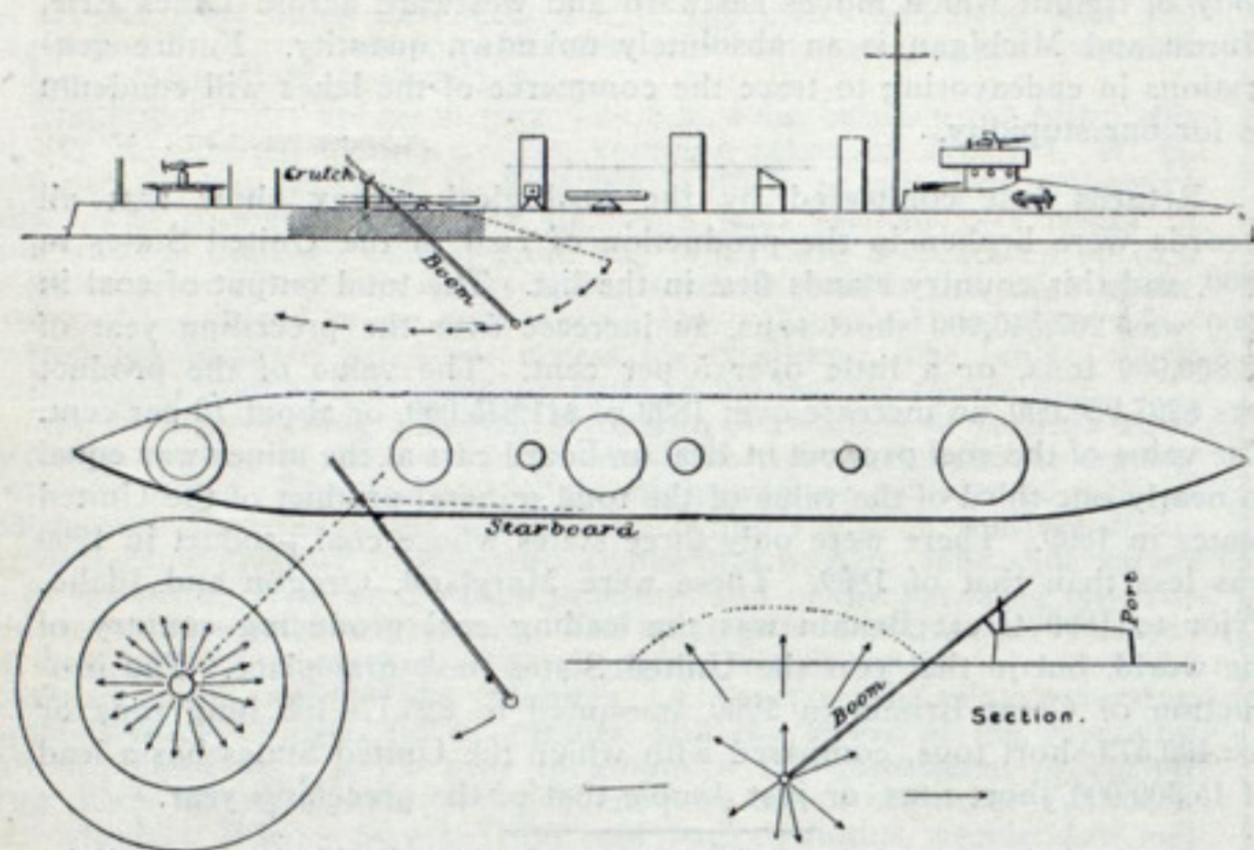
PIONEER FUEL CO.'S DOCKS AT DULUTH, MINN., A POINT AT THE HEAD OF THE GREAT LAKES FOR DISTRIBUTION OF COAL THROUGHOUT THE NORTHWEST.

Lord Selborne, first lord of the admiralty, discussing the naval position in the house of lords, maintained that the British Mediterranean fleet was sufficient to meet all exigencies, and could speedily be made equal to any possible combinations. He announced that two submarine boats were now being built, one of which would be ready for trial in September. He added that the remainder of the year 1901 would witness the completion of three armored cruisers of the Cressy class, four first-class barbette ships of the class of the Formidable, and two first-class barbette ships of the class of the Canopus. Lord Selborne said the first half of 1902 would see the completion of two more vessels of the Cressy class, two others of the Formidable class, one armored cruiser of the Monmouth class, and three armored cruisers of the Drake class. The first lord of the admiralty added that the total number of destroyers built or building was 113, and of the five submarine vessels already ordered the first would be ready for trial next September.

ENGLAND'S SUBMARINE BOAT DESTROYER.

Last week the Review called attention to the report that the English have discovered an antidote to submarines. The British call it one of the most important inventions of the age from the British standpoint—not from what submarines are but from what they might become but for the evolutions of a means to effectually destroy them. The Engineer of London devotes considerable space to a discussion of the subject, and says in part:

"In the present state of the science a submarine attacking a ship is bound to come to the surface to take bearings, or else to betray her presence with an optic tube or periscope. With this new invention—evolved in the Vernon and tried recently before the lords of the admiralty—the sighting of a submarine entails her almost certain destruction.



Sighting is now practically certain. It is not to the public benefit that the means which will be employed should be stated, for the principle has other and varied uses. We will pass on, therefore, to a brief description of the means of destruction. The shaded part of the hull of the destroyer in the figure indicates plates that have been strengthened on the starboard side. Above these is a crutch upon which a boom, 42 ft. long, works. This boom normally stows inboard and forward. At the far end of it a charge of explosives is carried, explodable as are all spar torpedoes. On going into action the boom is slung out well forward, and immersed in the water at the proper moment. This immersion carries the boom end downward and aft, and it is exploded directly the submarine is passed. The speed of the destroyer carries her past the center of the explosion before its full effects reach her, though in any case destroyers are too light and 'cork-like' to be seriously affected. The submarine down in the water is in a different case. It experiences the full force of the terrific concussion. Within from 60 ft. to 100 ft. or more of the center of explosion, according to the charge employed, the sides of the submarine should be compressed sufficiently to cause fatal leaks, while even at a greater distance stability should be destroyed. It will be seen, then, that the equivalent to a 'miss' is hardly to be expected.

"The single experiment carried out at Portsmouth was not enough to indicate exactly the best position for the boom, and the first boats to be fitted will probably vary somewhat between having it on the quarter or right aft. The additional weight of the boom is slight; in the case of the Starfish, the destroyer experimentally fitted, the weight has been more than compensated for by fitting her with aluminium instead of the usual torpedo tubes. This particular device is merely one of several equally simple remedies against submarines. That the admiralty has busied itself in this connection is a matter for considerably more congratulation than the building of submarine boats for the British navy."

LIDGERWOOD-MILLER MARINE CABLEWAY EXHIBIT.

An extremely beautiful model of the Lidgerwood-Miller marine cableway, 35 ft. long, is on exhibition at the Pan-American exposition in the ordnance building, and illustrates in a very realistic manner the method by which vessels can be coaled at sea. The model shows the operating winches just as they will be installed on the battleship Illinois, for which the Lidgerwood Mfg. Co. has recently been awarded contract. The cableway is shown in operation and the model is so contrived that an electric motor causes the collier to pitch, thus demonstrating the method of operating the cableway in spite of the relative motions of the ships. The exhibit is attracting a great deal of attention.

Low Rate Excursion to New York via B. & O.—Tickets on sale daily until Oct. 20 with privilege of returning via Buffalo. Call at city ticket office, 241 Superior street. Oct. 20.

SPICY SKETCH OF MR. D. H. BACON.

A spicy sketch of Mr. D. H. Bacon, formerly president of the Minnesota Iron Co., comes from one of the Georgia newspapers. Mr. Bacon's numerous friends in the great lakes region will probably conclude that he has developed—in the imagination of the newspaper correspondent—some new traits of character since going south to take charge of affairs of the Tennessee Coal & Iron Co. The sketch, which follows, is reprinted on account of the manner in which it is written, more so than for the facts which it contains:

"Birmingham has a man whose very presence fills the atmosphere with a filmy dread. That man is Don H. Bacon—a small man with a small name. But a man with brain, with energy, with determination, with nerve, with training, with ability and withal power. Mr. Bacon is chairman of the board of control of the Tennessee Coal & Iron Co., the largest corporation in the Birmingham district. This corporation owns and works the largest amount of coal lands of any company in the south. It owns and works the largest number of iron furnaces of any company in the district. It owns and works the largest steel plant in the south. And it employs several thousand men. The company owns a total of 428,648 acres of various coal and mineral lands in the states of Alabama and Tennessee, which lands yielded 7,809,927 tons of the five products of the company in 1899. The company bosses the men who work these acres and all men connected with the handling of the products, from miners to sales agents. It is autocrat of all—an enormous sovereignty. Don H. Bacon is boss of the company and his power is absolute in all respects. Little wonder he is feared. Little wonder all the horde of employees tremble in his presence. Yet with all this power there would not be the dread of him that fills the minds of the hundreds of employees were it not for the fact that he is known as an absolutely fearless man in the district. All realize that to come into disfavor in his eyes is to lose such positions as are held. The amount of stock you may hold, the influence you may control, does not count. It is all the same. Unless you have his favor you have no position.

"When he was first appointed chairman of the board of control he came to Birmingham and created the most absolute sensation of the year by asking for resignations and discharging men on an extensive scale. Men of money, men of training, men of some ability and men of great influence—all fell before his word. I do not recall the number of changes made, but they were numerous. One story is told of a visit by him to the Ensley steel plant. There he found men at work with a nervous haste. He walked in the place and glanced about him. He asked the name of workmen, pointing toward them and when answered requested the superintendent to give them a week's notice and let them leave. And so he established an authority no one dares question. His every order, no difference to whom given or on what subject, is obeyed with a startling alacrity. His presence in the district keys the nerves of all the company's employees to the highest pitch. He commands without hesitation and his men must obey without hesitation.

"The man—he is small of stature, cold eyes, firm jaws, controlling lips, broad brow, elastic step, strongly muscled, with a rather loud voice. He talks by using a few words. He never hesitates to tell what he thinks you should know. Then he stops. He speaks plainly, though not bluntly. But he never says too much. He is not unkind; but he is busy. He cannot be worried by long conversations. He has too many duties to perform for the Tennessee Coal & Iron Co. He is its boss. Mr. Bacon is a western man. He is a self-made man. He is a man who begun at the very bottom. He is a man who at one time performed manual labor. He is untiring. And the success he has won has been a deserving success, hard-worked-for, and for a long time sparingly given him. Little else is known of him, because he is feared. He is possibly more wonderful than Schwab—the million-dollar-a-year-man. If he is not more so, he is certainly as much so. And he is different in one respect. That he is satisfied to be Mr. Bacon without letting the world know too much about him or placing himself in public light always. But he is older than Mr. Schwab. That may be the reason of it all.

"With all of Mr. Bacon's autocratic policy there is a soft and manly feeling about him that appeals to any man who loves the fearless and true. This is shown no better than by his actions while president of the Minnesota Iron Co. It is stated that the policy of the company under his management was most altruistic, and in many respects unique as to its employees. The company for the last five or six years previous to the time Mr. Bacon left it employed about 1,900 men. In all its history a pay day was never missed and invariably cash was given the employees. This, though at one time it gave a bonus of \$700 to secure \$7,000 currency, and at times it was impossible to get cash on the paper of the largest steel companies in the country with the Minnesota's indorsement.

"Mr. Bacon was born in 1850 in Bradford county, Pennsylvania, and in 1862 went west and located in Michigan. When nineteen years of age he became a telegraph operator for the Cleveland Iron-Mining Co., which has since become the Cleveland-Cliffs at Ishpeming. He studied the science of iron mining—an industry then in its infancy as far as the west was concerned. He began at the bottom in the state of Michigan and grew up with the industry. By steps successive he passed from operator to timekeeper, to cashier, to assistant superintendent, until he reached the superintendency of the mine in 1880. In 1883, when Jay C. Morse retired, he became agent, or manager, for the mine. In that position he remained until 1887, when he went to Minnesota. From that time Mr. Bacon's rise has been as natural and as sequential as the rise of all the men of genius, fearlessness and ability. From manager of the Minnesota he soon was promoted to the presidency. Then he was further promoted to the chairmanship of the Tennessee Coal & Iron Co., where he is adding to his success and reputation by the manner in which he is managing the affairs of the company—a company with \$34,000,000 assets and employing about 14,000 men."

Mr. Bernard N. Baker, president of the Atlantic Transport Co., has presented to the British navy the hospital ship Maine. The gift has been formally accepted by the Earl of Selborne, first lord of the admiralty. In his letter Mr. Baker said: "I trust she will long be an emblem of the cordial relations existing between the citizens of the United States and those of the mother country." The English papers all express the keenest appreciation of Mr. Baker's gift.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

Published every Thursday at No. 418-19 Perry-Payne building, Cleveland, Ohio, by
THE MARINE REVIEW PUBLISHING CO.

SUBSCRIPTION—\$3.00 per year in advance; foreign, including postage, \$4.50, or 19 shillings.
Single copies 10 cents each. Convenient binders sent, post paid, \$1.00.
Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

Possibly a comparative monopoly may be built up in oil. The known petroleum deposits are not many and it is conceivable that they may be controlled by a single powerful interest. But steel is evidently a commodity which cannot be controlled by any one organization, no matter how vast or how consummately managed. To obtain a monopoly of the product one must control the sources of its raw material. The United States Steel Corporation is a pretty big affair and it starts in life with the most magnificent equipment that ever a business venture was endowed with. If anything could control steel making one would think the United States Steel Corporation could; but it cannot. Big as it is it cannot. Iron ore is pretty liberally sprinkled over the face of the earth. The steel corporation owns its share absolutely in the Lake Superior region, but there is enough left there and elsewhere to preserve a balance. New companies are springing up in a night and are serving to emphasize the fact that no monopoly can exist in steel making. Andrew Carnegie said some time ago that competition would always exist in the steel business. During the past three months unusual activity has prevailed in the steel world. Things have been moving at a terrific clip. The front of steel making has entirely changed. Established concerns, realizing that the beaten track which had served so well for so many years could no longer be successfully followed, have gone into the market for money and have put it directly into equipment. Every steel plant of importance is strengthening its position, either through reorganization or consolidation. New money is flowing into the steel business from all sides. The steel corporation will meet competition and lots of it. Its source of strength to meet this competition lies in its ore deposits.

One of the early effects of industrial combinations was the elimination of the traveling salesman. He went the way of all useless appendages, for assuredly he was useless when the firm which employed him merged its interests with its competitor. Things move in cycles, however, and the era of the traveling salesman is about to dawn again. The domestic field is largely closed to him, as it has been for some years past, but the foreign field is opening. The United States is producing a surplus which must be disposed of. Foreign markets cannot be successfully cultivated by circulars alone. Circulars can herald the advance of the salesman but they cannot always sell goods. The magnetic personality and persuasive tongue of the salesman is needed. The foreign market is a difficult field to handle and the demand upon the talents of the traveling salesman is great. He must be versatile, gentlemanly and educated. He must speak the language of the country to which he is sent. He must be a diplomat who has devoted his attention to business. The over-sea market is the market of the future. It is the one market whose possibilities cannot be measured. To all practical purposes it is infinite. With proper cultivation no end of trade will come out of it. It is idle to think, however, that this trade can be secured without personal representation. It cannot. Contiguous countries have the natural advantage which can only be overcome by a representative on the spot with full power to act. The logical conclusion is that that army of workers which did so well to develop internal trade when there was need of them will, when transferred to Europe and the orient, do the same thing for the foreign trade of the United States.

The question of the superposed or ordinary turret is again on in Washington. This question resembles the oft-referred-to ghost of Banquo in that it will not down. When Hichborn was the chief constructor of the navy he was wont to say that he would be found dead in the last ditch before he would approve the superposed turret. He also prophesied that he would whip the advocates of the double turret to a standstill before congress. He went out of office breathing fulminations against what he called the all-eggs-in-one-basket system. The superposed turret, however, was adopted for the five battleships for which contracts were lately let. This form of turret received the indorsement of two special boards. Now, however, the naval board of construction is considering plans for the two battleships authorized in the last naval act and have run up against the superposed turret. The board met this week and it developed that three of its five members are opposed to the double system. The three are Chief Constructor Bowles, Chief of Engineering Melville and Chief of Ordnance O'Neil. The two who favor it are Rear Admiral Bradford and Capt. Sigsbee, the naval intelligence officer. The fight is over two plans

now before the board. One of these provides for a battery of four 12-in. rifles in two ordinary turrets, one forward and one aft; and fourteen 7-in. rifles, arranged in two broadsides of five guns each, and the other four sevens on the superstructure. This is the majority plan. Rear Admiral Bradford has proposed a battery of four 12-in. and four 8-in. rifles in two superposed turrets, each containing two twelves and two eights; four eights in two ordinary turrets, one in each waist and broadside of sixes.

During the past two years the need of a department of commerce has received additional emphasis by the tremendous volume of our exports. Time was when the commerce of the United States was pretty much internal. Now it has grown to be as well the greatest exporting nation in the world. The secretary of commerce would be an important figure in the cabinet. In the export field in particular the services of a secretary of commerce would be invaluable. Trade complications frequently occur abroad and are sufficient to justify the services of an independent staff. The secretary of state is too much concerned in purely governmental matters to watch closely the arteries of trade. Another thing the secretary of commerce could do. He could probably influence congress to pass laws to compel the lake transportation lines to record the movement of freight in their boats. It is a shame that as late as the twentieth century there should be no record of the volume of freight moving across these lakes. The only record which exists is that of the tonnage passing through the government canals at Sault Ste. Marie. This measures the Lake Superior freight movement only. The great body of freight which moves eastward and westward across Lakes Erie, Huron and Michigan is an absolutely unknown quantity. Future generations in endeavoring to trace the commerce of the lakes will condemn us for our stupidity.

Returns just completed by the geological survey show that all records were broken in the production of coal in the United States in 1900, and this country stands first in the list. The total output of coal in 1900 was 267,540,000 short tons, an increase over the preceding year of 13,800,000 tons, or a little over 5 per cent. The value of the product was \$297,920,000, an increase over 1899 of \$41,845,000, or about 16 per cent. The value of the coal product in 1900 on board cars at the mines was equal to nearly one-third of the value of the total mineral product of the United States in 1899. There were only three states whose coal product in 1900 was less than that of 1899. These were Maryland, Oregon and Idaho. Prior to 1899 Great Britain was the leading coal producing country of the world, but in that year the United States took first place. The production of Great Britain in 1900 amounted to 225,170,163 long tons or 252,190,573 short tons, compared with which the United States has a lead of 15,300,000 short tons, or just double that of the preceding year.

A reorganization of the executive personnel of the National Steel Co. and the American Steel Hoop Co. (parts of the United States Steel Corporation) was effected at meetings of the boards of directors in New York, a few days ago, by the election and appointment of the following officers for both companies: W. E. Corey, president; H. P. Bope, first vice-president; W. W. Blackburn, second vice-president; W. W. Blackburn, secretary; W. C. McCausland, treasurer; Henry P. Bope, general manager of sales; J. P. Kessler, Jr., general agent; D. G. Kerr, ore supply agent. The result of the reorganization is that all of the new officers are officials also in the Carnegie company. The general offices of both companies have been transferred from New York to Pittsburg, and business will be continued with headquarters in the Carnegie building without change of names.

In furtherance of the trials of water tube and Scotch boilers, the British admiralty has just sent out from Devonport for special runs to the Mediterranean two cruisers, the Minerva and Hyacinth. The Minerva has Scotch boilers and the Hyacinth has Belleville boilers. Both warships are of almost the same coal capacity, as they are sister ships. Members of the government boiler commission are on board each vessel. The Minerva and Hyacinth are to steam at 16 knots' speed to Gibraltar, cruise around in those waters, clean their boilers and then race home. The Hyacinth is the favorite in the betting.

A comparison of the growth of the United States export trade with that of other nations of the world shows that the United States in the fiscal year just ended has made the greatest increase. During the available portion of the fiscal year the increase in exports from the United States has averaged \$9,000,000 per month; that of the United Kingdom, \$3,000,000; Russia, \$3,000,000; France, \$2,000,000; Canada, \$2,000,000; Austria-Hungary, \$1,000,000; Mexico, \$1,000,000; Germany, a loss of \$2,000,000 per month; Spain, a loss of \$2,000,000 per month, and Belgium, a loss of \$1,000,000 per month.

Of course it was a typographical error in the last issue of the Review that gave 700 ft. length to two steel steamers building at the Cleveland yard of the American Ship Building Co. for transatlantic service, and which are each to go to the seaboard in two parts. The vessels are to be of 7,000 tons capacity when in salt-water service, but their length is only 443½ ft. over all and 430 ft. keel.

MACHINERY OF NEW INTERNATIONAL LINERS.

[Special correspondence to the Marine Review.]

Glasgow, Scotland, July 1.—In the Review of May 2 last appeared a description of the steamer Haverford, building at the works of John Brown & Co., Ltd., Clydebank, Glasgow, for the International Navigation Co. of Philadelphia. The Haverford is nearing completion, and a sister ship, the Merion (both for New York-Southampton service), will be launched shortly. The description of boilers and engines, also built by John Brown & Co., who make machinery for all vessels they construct, was brief and some additional information on that score follows:

In each of these vessels there are two double-ended and two single-ended boilers. The double-ended boilers are 16 ft. 8 in. mean diameter by 19 ft. long, and the single-ended boilers are 16 ft. 8 in. mean diameter by 11 ft. long. Each of the double-ended boilers has eight furnaces and the single-ended boilers have four furnaces, being twenty-four in all. These furnaces are of the Morison suspension type, $34\frac{1}{2}$ in. inside diameter, with the back ends made on the Gourlay-Stephen principle, whereby a defective furnace can be taken out of the boiler without disturbing any other part of it. The end plates of the boilers are all flanged inwards to meet the shell and the furnaces.

Each opposite pair of furnaces in the double-ended boilers has a common combustion chamber; and in the case of the single-ended boilers, each furnace has a separate combustion chamber. The combustion chambers are all securely stayed to the boiler shell and ends. The combustion chamber tops in the single-ended boilers are supported by girders in the usual way, while those in the double-ended boilers are supported by stays attached to the shell of the boiler. The end circumferential seams are double-riveted and the middle circumferential seams are treble-riveted. The double butt strap longitudinal seams are also treble-riveted with five rivets per pitch. The cross seams in the end plates are all double-riveted, and all the rivet holes were drilled after the plates had been bent and flanged and fitted together in place, after which they were taken apart and the burrs cleaned off the rivet holes.

The boiler tubes are all of iron, 7 ft. 5 in. long between the tubeplates and $3\frac{1}{4}$ in. external diameter. The common tubes are No. 7 I. W. G. thick and the stay tubes are $\frac{1}{4}$, $5/16$ and $3/8$ thick, to suit their respective loads. The common tubes have the front ends swelled $1/16$ larger in diameter than the back end, and the stay tubes have been staved up in a hydraulic press till the thickness at the screwed ends is the same at the bottom of the thread as the body of the tube. There is 11 in. clear space between the nests of tubes for access for cleaning. The boilers work under natural draft at a working pressure of 160 lbs. per square inch.

The main propelling machinery consists of two sets of vertical triple expansion engines of the usual inverted marine type, each cylinder driving a separate crank. The diameter of the high pressure cylinder in each set is 29 in., the diameter of the intermediate cylinder $46\frac{1}{2}$ in. and the diameter of the low pressure 75 in. with a stroke of 4 ft. 3 in. The slide valves are of the piston type for the high pressure, and of the flat-faced type for the intermediate and low pressure. The valve gear is of the double eccentric, double bar link motion. The air pumps are driven by levers off the crosshead of the intermediate cylinders. A direct acting steam reversing engine is fitted to each set of engines, and the levers of the reversing shaft are fitted with screw gear to admit of the adjustment of cut-off being made in one cylinder independently of any of the other cylinders. The cylinders, liners, covers, front and back columns, condensers and sole plates are all of cast iron, the condensers forming part of the main engine framing. All the shafting is of steel, and each crank shaft is of the built type, in three interchangeable pieces. The main bearings, thrust shoes and tunnel blocks are all lined with white metal. The propellers are four-bladed, the bosses of cast iron and the blades of manganese bronze.

The auxiliary machinery consists of two centrifugal pumps for circulating the water through the main condensers; two vertical simple pumps with float gear, capable of feeding the boilers when working at full power; two ballast pumps; one sanitary and one fresh water pump, and also a donkey boiler feed pump. There are also a feed heater and filter and a very complete distilling plant. An Aspinall governor is fitted to each engine.

DISPOSAL OF STEEL SURPLUS.

The United States Steel Corporation, since its formation a few months ago, has been a merry subject for the trenchant pens of the European technical press. Scarcely an issue goes to press without an exhaustive treatise upon the affairs of the great corporation, and it is surprising, indeed, with what excellent knowledge they are discussed. At present it is the attitude of the great corporation towards the export trade that seems to interest them. This was one of the phases of the situation which they saw at the beginning and which they have since watched more or less closely. They find that Mr. Schwab has Carnegie's views on surplus—to sell abroad at whatever figure can be best obtained in order to keep production at the maximum. Engineering of London says:

Those good people who refused to believe that American manufacturers of pig iron and of steel billets, plates and rails would sell their productions at a loss in foreign markets, in order to gain a footing there and to relieve the domestic market, may be recommended to pay attention to the evidence given the other day by Mr. C. H. Schwab, president of the United States Steel Corporation, before the industrial commission, a body which has been sitting at Washington for a year or two past, for the purpose of investigating the industrial conditions of the United States with especial reference to the operation of trusts. Mr. Carnegie, when he was in business, called it the "law of surplus," and there is no denying that, in practice and from the point of view of the manufacturer as distinct from the home consumer, the practice has something to recommend it. Said Mr. Schwab before the commission: "Export prices are made at very much lower rates than those for domestic consumption, and there is no one who has been a manufacturer for any length of time who will not tell you that the reason why he made those prices even at a loss was to run his works fully and steadily." He added that a little of this unprofitable business is being done even now when the home demand suffices to absorb the production, but that the sole motive—except, presumably, in the case of the forward contracts entered into last year when trade in America fell away appreciably—is to keep in touch with foreign markets.

During the depression in the American steel industry in the spring of last year Mr. Schwab himself sold large quantities of steel for export, which he was almost unable to deliver when the time for executing the contracts came round, because of the revival which had meanwhile taken place in the home demand. The export business is assisted by the railway companies, who are often ready to reduce their rates on the carriage of goods to the seaboard when these are intended for export to foreign countries. The general proposition Mr. Schwab stated in these terms: "When we have as much as we can do at home, as we have today, we are not anxious to sell at low foreign prices; but when our mills are not running steadily, we will take anything, at any price, even if there is some loss in so doing, in order to keep running." The confession goes a very long way to account for the increase in exports of iron and steel and manufactures, especially during the last three years or so. The present production of pig iron is at the rate of 15,750,000 tons per annum, and if maintained, the result must be over-production. For orders for finished materials have gone off sharply, and while much of the pig now being turned out is in the execution of contracts covered some time back, there remains a balance which will in due course come over to Europe. It is probable that the country is unequal to the consumption of such an output as this even in brisk times, and as production in bad times does not decline to the same extent as the demand, one can look forward to enhanced consignments to this part of the world when the necessities of the case demand such a sacrifice. Under normal conditions of trade such an economic monstrosity would be impossible. But the United States Steel Corporation controls 60 per cent. of the country's total output of iron, and is consequently in a position to impose its own prices, the more especially as the independent producers find it to their interest to work in harmony with it; while both are aided by the tariff, which precludes all prospect of successful foreign competition on American soil.

There is a considerable party in the United States which argues that the country's economic policy has had nothing to do with the recent foreign trade developments that we have in mind; that a new country, rich in virgin resources, advantageously disposed, could not in any marked degree stimulate or retard through as long a period as a quarter of a century an industrial development so essential to its material welfare as that of iron and steel manufacture; that no artificial system of imposts operating as a scheme of indirect bounties was needed to give to great natural advantages an overshadowing importance in international trade; and that had this economic policy stood in the way of the normal development, it would have been overturned long ago. It seems tolerably clear to us, however, that the suddenly-acquired importance of America as a source of supply for manufactured goods is wholly due to this economic policy, which, whatever its promised and accomplished benefits, was not designed to foster international trade; and, in gauging the extent of the actual advance, it must be borne in mind that there has been an enormous amount of juggling with the figures of iron and steel exports—that the values are not those for which the goods are sold, but those prevailing in the domestic market, and that anyway the American manufacturer has not profited, because much of his export is sold at or under the cost of production. If the duties were removed, an entirely new condition of things would spring into existence, and American steel manufacturers would find themselves confronted with difficulties in the way of export, which, unfavorable to themselves, would undoubtedly benefit their home customers.

It may be permitted to us to point out that Mr. Schwab's declaration before the industrial commission was not exactly consistent with his remarks in a recent issue of the North American Review in the course of a symposium on the subject of combinations and their incidence. In that symposium other giants took a part—Mr. Russell Sage, the Wall street banker; Mr. Charles R. Flint, treasurer of the United States Rubber Co.; Mr. F. B. Thurber, president of the United States Export Association; Mr. J. J. Hill, of the Great Northern Railway; and Mr. James Logan, general manager of the United States Envelope Co. Monopoly and industrial tyranny, said Mr. Schwab, have been the popular conception of trusts and combinations. But in the larger application of the principle, it has been "proved that instead of grinding the workingman and victimizing the consumer it produced a higher standard of wages and a lower cost in the market." The idea is elaborated, and insisted upon throughout the argument. For instance, Mr. Schwab stated that "a combination, like an individual concern, can only hold its trade provided it gives the best goods at the lowest market price consistent with a reasonable profit." Mr. Hill observed that "in self-defence the big concerns must keep their prices within the figure that will secure the greatest number of purchasers;" and the other gentlemen said the same thing in other words. The principles are as sound as the multiplication table. It is in the application that one sees reason for doubt as to the future. To aim at a fair price is laudable; but we want a clear definition of the word, if it is to be had. There is surely something wrong with a procedure which, by the aid of tariff boundaries, makes the domestic consumer pay much more for his goods than the man 3,000 miles away.

As a result of a defect in some of the automatic valves in a big new caisson which has been built for dry dock No. 3 at the New York navy yard the caisson sank, a few days ago, while it was being got into position. The caisson is used to close up the end of the dock. It is a big, hollow, iron vessel and was to have been floated until it fitted in the bill of the dock, when the valves would have been opened and it would have been sunk into position. Preparatory to towing the caisson to the end of the dock, it was decided to make a test of the automatic valves. Some of the valves would not shut after they had been opened and the caisson, filled with water, keeled over and sank, resting on its side in the mud near the end of the dock. It will, of course, be pumped out and floated after the valves are fixed, but the government will be very much inconvenienced on account of the delay. The dry dock, of which it is to form a part, is the one with which so much trouble has been had and which, on account of a series of mishaps, has been called the hoodoo dock. It is the largest in the yard, and was formerly built of wood. It was afterward changed to concrete.

One cent a mile to Buffalo via the Nickel Plate Road, good going on July 2, 9, 16, 23 and 30, and returning within three days from date of sale. Write, wire, 'phone or call on nearest agent, or E. A. Akers, C. P. & T. A., Cleveland, O. July 30

CHESTER AS A STEEL CASTING CENTER.

The Review in its last issue devoted some space to an historical account of Roach's Ship Yard, Chester, Pa., which was published in a souvenir edition of the Chester Times. The same edition also contained a pretty thorough account of the iron and steel industries at Chester. Indeed it is an excellent exposition of the industry of that thriving city and is far more accurate than is the ordinary run of newspaper "write-ups" of that character. With these manufacturing industries the Review is closely associated, because ships, during these latter days, need steel, inside and out, more than they need anything else. The Review, therefore, takes pleasure in giving more extended and direct circulation to the account not of the steel casting concerns alone but of other works associated with the building of ships.

We will begin with the Seaboard Steel Casting Co., which is the latest as well as one of the largest, and in whose extensive plant is incorporated the best ideas gained from the experience of years in the steel foundry business. Following is its history:

The first steps toward the founding of the corporation were taken by Senator William C. Sproul in the fall of 1899, and during the winter following, Mr. Sproul succeeded in interesting capitalists in the project, so that by March 20, 1900, the necessary capital had been subscribed and the company was chartered. The desirable tract of ground, embracing three blocks on the river front, was purchased, and immediately plans were made to erect the extensive buildings and equipment necessary to make up the plant. Mirabeau Sims, who, while yet a young man, has had an experience covering many years as a steel foundryman, was elected superintendent, and gave his personal attention to the construction of the plant, the work being pushed forward with all possible speed and a record made in the short time occupied in getting the works ready for operation. C. M. Ryder was the engineer in charge and designed the furnaces, gas producers and construction. The main foundry building, 560 ft. in length and 110 ft. wide, contains the molding, flask building and chipping departments, in addition to the two 25-ton open-hearth furnaces for the manufacture of steel, and the iron foundry which is kept busy in adding to the equipment of the steel foundry, in providing flasks and other appliances. The machine shop, 280x60 ft., joins the foundry, and through this department the finished product of the foundry works its way to be treated by the various tools and machines in preparation for shipment. Adjoining this building and under the same roof is the power house, containing two high-speed engines directly connected with electric generators, the current from which supplies power to all the machinery in the various departments of the works. There are ten over-head traveling cranes operated by electricity and with a capacity of from ten to thirty tons each.

The Seaboard Company's transportation facilities are unexcelled, the tracks of the Pennsylvania and Philadelphia and Reading railways both entering the yard and a wharf running to deep water in the Delaware river, is now being constructed. A large pattern warehouse, 60x130 ft. in dimensions, is now being erected. The products of the works include steel castings of every description, from a few pounds to forty tons in weight. The character of the material used and the care in molding and in the mixing and melting of the metal have already made the Seaboard steel castings very favorably known in the mechanical world. The officers of the company are: William C. Sproul, president; Joseph W. Cochran, secretary and treasurer; Mirabeau Sims, general superintendent, and D. G. Stokes, comptroller. The directors are Joseph Wharton, Isaac H. Clothier and Edwin S. Cramp of Philadelphia; J. Henry Cochran of Williamsport; Thomas H. Savery of Wilmington, Del., and John B. Roach and William C. Sproul of Chester.

THE VULCAN WORKS.

The Vulcan Works, one of the oldest establishments of its kind in the country, is thus described:

The late William H. Green, Sr., was induced to resign the office of chief engineer of the United States navy to take direction of the Globe Works at Boston. The new associations were not satisfactory to him, and about the year 1864 he built the Vulcan Works of Chester. For years they were uninterruptedly operated under his direction and after his death under the management of his son, William H. Green, Jr. The Vulcan Works have deep-water frontage on the Delaware river and sidings from the Pennsylvania and Reading railways enter the buildings, thus greatly facilitating the shipment of its output. In November, 1892, a charter was procured from the state. The stock of the company is held wholly by the family of the founder, William H. Green, Sr. The plant comprises an iron and brass foundry, machine and erecting shops, boiler and plate works, pattern shops and offices, with ample cranes and tracks for handling heavy material. The specialties made at the Vulcan Works comprise heavy iron and brass valves and cocks for waterworks, marine engines, rolling mills and steel plants, etc., and also the well known Jenkin's marine engine governors, as well as hydraulic pumps and presses, steam and hydraulic compressors, iron, brass and open hearth castings. Machinery outfits for a large number of steel works have been made at this establishment. Most of the governors used on the United States naval vessels have been made at these works and they have also been furnished in great numbers for merchant steamers. The officers of the company are: Vice-president, William H. Green, Jr.; the president's office has never been filled since the death of William H. Green, Sr.; secretary and designing engineer, E. T. Robb; treasurer, M. J. Green.

THE AMERICAN STEEL CASTING CO.

Following is the history of the American Steel Casting Co., which operates large works at several points other than Chester:

The Standard Steel Co. was incorporated June 22, 1883, with Pedro G. Salom, president; William E. Trainer, vice-president; Richard Wetherill, treasurer, and John B. Roach, secretary. A tract of ten acres was purchased adjoining Thurlow station on the Philadelphia, Wilmington & Baltimore railroad, and the construction of the plant went forward so expeditiously that on March 1, 1884, the manufacture of steel by the open-hearth Siemens-Martin process was begun, seventy men being employed at that time. The business grew rapidly and in order to meet these conditions additional buildings were erected and 300 persons were given employment. In 1889 a steel rifle cannon was cast at these works;

bored and turned complete, which successfully stood the rapid firing test of ten rounds, the weight of the projectile being 100 lbs. and the muzzle velocity 2000 ft. a second. All the ordinary requirements demanded by the United States when trying ordnance of large calibre were fully met in the experimental tests applied to the Standard cast steel cannon but bureaucratic prejudices, notwithstanding the excellence of the results obtained by the tests, prevented the adoption of cast steel guns in the military and naval services of the general government. The incident, however, will enter into the history of American ordnance manufacture and due credit will be given the cast steel cannon made at Chester, the first of the kind in all the world, for steel cast guns will finally be adopted. In the casting of hollow steel shafts of upwards of 20,000 lbs. in weight, these works hold the world's record.

In 1892, the Standard Steel Company's plant in Chester was purchased by the American Steel Casting Co., which owns plants at Sharon and Pittsburg, at Alliance, O., and Syracuse, N. Y. The principal office of the company is located at the Standard works. The plants owned and controlled by the company, are among the best equipped for making steel casting in the United States. The output of these works consists of castings for all kinds of machinery, locomotive, marine and stationary engines, bridge materials, trolley line machinery, ships' stems, stern posts, rudder frames, struts, stern tubes and the like; ordnance and fortification fittings, and in fact, cover all articles to which steel castings can be applied. At these works were cast a number of Buffington-Crozer disappearing carriages for use in coast fortifications where heavy cannon are so mounted that, when in action, the gun rises when fired and disappears when being reloaded. The machinery carrying that kind of ordnance must be exact in construction, of the best material and workmanship. The carriages cast at the American works met the official tests so successfully that the ordnance bureau of the war department congratulated the company on the good results obtained. The officers of the company are: President, Daniel Eagan; secretary, C. Foster; treasurer, J. H. D. Eagan; directors, Daniel Eagan, N. H. Laczelt, J. A. Middleton, C. I. Travelli, Robert Wetherill, T. H. Buhl and A. C. Wall.

THE TIDEWATER STEEL CO.

The Tidewater Steel Co., which was incorporated under the laws of Pennsylvania, April 6, 1899, is one of the latest acquisitions of the industrial life of Chester. The company makes tank, shell, flange, fire-box, ship and marine steel plates, foundry and basic pig iron and high-grade open-hearth steel ingots, billets and slabs. The output is a result of labor and careful study of new methods, improvements and perfected ideas having taken place from time to time until it represents the highest point of mechanical skill. The plant is very large, covering in its entirety about thirty acres of land, having a frontage of 820 ft. on the Delaware river, and is divided into different departments, the whole forming a complete and modern steel works. Every appliance necessary to carry on this line of industry is secured as soon as its practical adaptability has been proven. It has the finest of shipping facilities, large piers, allowing the largest vessels to load and discharge, while spurs of the Pennsylvania and Reading railways traverse the yard. The blast furnace, 17x70, is equipped with three fire brick hot blast stoves, and has a capacity of 150 tons of pig iron daily. In the open hearth department there are three 50-ton basic open hearth furnaces, all in operation, making a total capacity of 300 tons of steel ingots per day. In the plate mill department is one 112-in. three-high plate mill. It is fully equipped with run out and cooling tables, straightening machine, hydraulic shears, electric shipping cranes and every modern appliance for the economical handling of material. Its capacity is 200 tons of finished plate per day. The equipment of this department also includes a 72-in. three high plate mill, also thoroughly provided with all modern appliances. The daily capacity of this mill is 50 tons of light weight plates and sheets. The plant also includes a fine laboratory and testing department, a pumping station of large capacity, electric power and light stations and a well-equipped machine shop. Power is furnished by steam, electricity, hydraulic and air. About 700 workmen find steady employment. The output finds sale all over the civilized world, and consists of foundry and basic pig iron, basic open hearth steel ingots, billets and slabs, while a special feature is made of fire box, boiler, ship and tank plate. Plates can be rolled up to 2 in. in thickness, and in various widths and lengths. The officers and directors are: C. B. Houston, president; Paul Lamorelle, secretary and treasurer; Evans R. Dick, George S. Graham, C. B. Houston, A. S. L. Shields, George McCall, Charles A. Porter and Isaac N. Solis of Philadelphia, and F. W. Wood of Sparrows' Point, Md., directors.

THE CHESTER STEEL CASTING CO.

It is peculiar that although Henry Bessemer in 1856 had practically demonstrated that steel could be immediately made by passing cold air through liquid iron—a discovery that has revolutionized the iron and steel industry throughout the world and has done much to aid human progress—for nearly fourteen years no effort seemed to have been made toward practically applying the Bessemer process to steel casting in the United States. In the summer of 1870, the late William Ward chanced to meet Mr. McHaffy, a Scotchman, who had closely studied Bessemer's discovery, who had himself obtained some patent for steel casting, and who came to the United States, especially to bring the subject to the attention of American capitalists. Mr. Ward became interested in the project, and through his personal efforts a company was formed, which on Dec. 1, 1870, was incorporated under the title of the McHaffy Solid Steel Casting Co., and early in the following summer (1871) the first steel castings ever made in America, not alone the United States, were cast in Chester, an incident that will hold a place in the history of American industries. The public knew little about steel castings and it was only after persistent solicitation that even small orders could be obtained. The process itself was almost wholly new to most of the employees, and those in direction experimented rather than followed well-defined rules in the manner in which the work should be done. The parties who had invested capital in the enterprise were disappointed in the results. The experiments which had been made, however, were not without good results, for they directed attention to steel casting and the uses to which the process could be applied in the mechanical arts. Mr.

Ward never doubted the feasibility of the process or the benefits that would certainly follow when the difficulties in making perfect steel castings had been overcome. He interested himself in the formation of a new company with such success that on June 30, 1873, the Chester Steel Casting Co. was incorporated, and acquired the rights and plants of the McHaffy Solid Steel Co. Fortunately, about that time Frederick Baldt entered the employment of the new company, and under his direction excellent work was done. Castings made at Chester were put on exhibition in many of the large cities and in a number of cases medals were awarded the company, noticeably by the Franklin Institute in 1876 and the Centennial Exposition at Philadelphia, the same year. The public had to be educated to the superiority of steel castings and that the cost relatively was not in excess of ordinary iron castings. The Chester Steel Casting Co. bore the burden of teaching the people of the United States those two essential lessons. Today Chester, in the annual output of steel casting, leads all other localities in this country.

The demand for steel castings in this country grew rapidly—one of the educational results of the Centennial Exposition—and although other plants were established, the mother plant at Chester shared in the benefits that came with the constantly enlarging uses to which steel castings were applied. The Chester Steel Casting Co. was compelled to purchase additional land, and erect additional buildings, from time to time, until from the small beginning of 1871 the plant has grown until nearly ten acres of ground, dotted with enormous buildings, are necessary to keep abreast with the demands of its constantly enlarging trade. The company makes a specialty of heavy steel castings, such as sugar mill and rolling mill gearing, as well as all kinds of gearing, cross heads, rocker arms, driving boxes and other castings for locomotives; crank shafts of all sizes, car castings, mining machinery and the like. Indeed the works are adapted to make steel castings of any shape or size required. From the experimental plant of 1871 offering employment to only a half dozen workmen, the Chester Steel Casting Co. now carries on its roll more than two hundred persons receiving monthly pay exceeding \$7,000. The present officers of the company comprises: President and treasurer, E. P. Dwight; secretary, A. G. Lorenz; superintendent, G. V. Lewis.

THE PENN STEEL CASTING CO.

The Penn Steel Casting Co. derives its name from the fact that the works are located in the neighborhood of the Penn Memorial Stone, which marks the place where William Penn made his first landing in Pennsylvania, in 1682. The plant had its inception in an organization perfected on Sept. 24, 1886, under the title of the Chester Foundry and Machine Co. Large buildings were erected and fitted with the latest and best improved machinery then obtainable. Louis Miller, who at the outset was the general manager of the works, was the patentee of a steam and hydraulic cotton compress, which often, in large orders, required castings of great weight and unusual size. The plant was designed to accommodate all classes of work from the delicate and small pieces of machinery that entered into the construction of the Brotherhood patent high speed engines to the ponderous massive castings, calculated to withstand the enormous pressure that was required in the largest-sized Miller cotton compress. The enterprise for a time was conducted very successfully, and among the output were the engines erected at the New Chester Water Co.'s pumping station. The depression that began in 1891 was severely felt by the Chester Foundry & Machine Co., whose capital was absorbed in the creation of the plant itself, hence when the evil times came, there was little reserved on which to draw in tiding over the stringency. The stock was mostly in the ownership of parties of limited means who could not respond to needed assessments on the shares to keep the works in active operation. The inevitable result under such conditions was a sale of the plant and personal property.

In 1892, the Penn Steel Casting Co. was organized with M. H. Bickley as president, Hugh Shaw, treasurer, John T. Dickson, secretary, and Frederick Baldt, manager. Although the times were depressed and the country on the eve of the longest period of business stagnation in the national history, the new organization after the purchase of the plant immediately began a costly addition. The labor and responsibility in effecting these changes in the works and the character of the output developed upon Mortimer H. Bickley, in the mechanical features ably seconded by Frederick Baldt, who is recognized throughout the United States as an expert in the manufacture of steel castings. All the financial management fell to Mr. Bickley, and he carried the enterprise successfully through the dreary period when the industrial energies of the nation seemed paralyzed, and even then the financial abilities of Mr. Bickley and the mechanical skill of Mr. Baldt had already placed the Penn Steel Casting Co. on a paying basis to be succeeded by a period of wonderful prosperity, while the stock of the company has quadrupled in value.

SOLID STEEL CASTING CO.

The Eureka Cast Steel Co. was incorporated early in 1877. A tract of four acres was purchased and buildings erected. In September of the same year the first steel castings made by the "Eureka process" were successfully run and the new enterprise started under favorable auspices. The public by this time was educated to the innumerable uses to which cast steel could be applied in the mechanical arts, when the cost of the material, owing to Bessemer's discovery, was reduced to that of ordinary iron castings. Orders were not difficult to obtain and business was brisk at the works. For some cause many of the castings proved defective, and complaints were more numerous than commendations from customers. The management at length induced Frederick Baldt, who because of the excellence of his work at the Chester Steel Casting Co.'s establishment, was then recognized, as he is now, as among the foremost steel casting specialists and experts in the United States, to accept the superintendency of the Eureka plant. Under Baldt's supervision the castings were highly satisfactory, orders were easily obtained and expeditiously filled. The increasing volume of trade compelled from time to time costly additions to be made to the works, much of which was constructed after Mr. Baldt had in 1883 severed his connection with the company. The business depression of 1894 was severely felt by the Eureka Steel Casting Co., many of its accounts proved uncollectible and finally its plant was sold to the Solid Steel Casting Co. The new owners made many additions and are now running the plant to its capacity to keep abreast with the orders. Richard Peters, Jr., is president of the company, and Felton Bent is general manager.

THE AMERICAN STEEL CASTING CO.

The American Steel Casting Co. occupies about twelve acres of land. The plant is a large one and is divided into foundry, machine shop, chipping shop, pattern shop, the whole being fully equipped with the latest improved machinery and appliances necessary for the rapid production of a superior article. The manufacture of castings by this company is under the supervision of officers who have had years of experience, enabling them to produce a high grade of cast steel which sustains for the concern an excellent reputation with the trade throughout the United States.

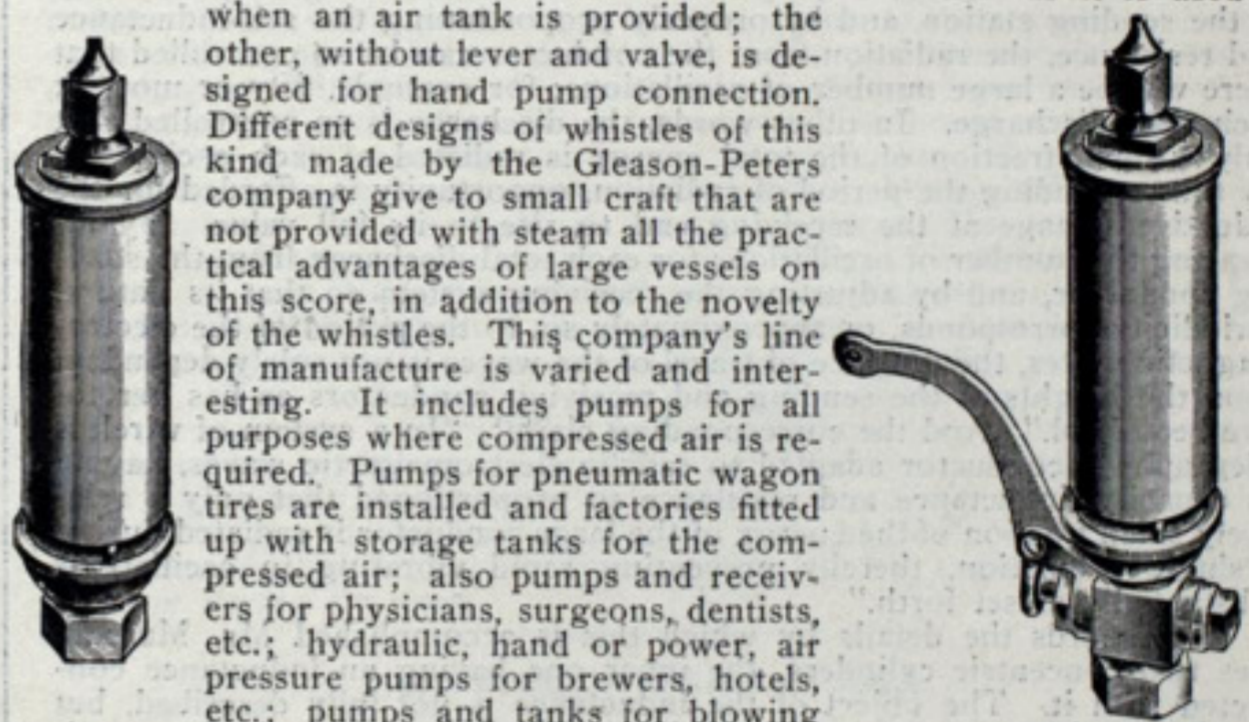
TRUSCOTT BOAT MANUFACTURING CO.

"American builders of small steam and gasoline pleasure launches have nothing to fear in invading the foreign markets except the competition of other American boat builders. In all the large ports of the world the launches made in the United States are considered superior to those made in other countries. In meeting the home competition, therefore, the delay in getting their boats to the foreign purchasers is the only handicap which American builders have. Our company surmounts this by having regular agencies in Paris, London, Amsterdam and other large European ports, at which a full line of our boats is always on exhibition. As soon as an order is received at one of these agencies it is cabled to us without a moment's delay. It is then our aim to have the order filled as soon as the transportation conditions permit."

In these words James M. Truscott summed up the rules under which the Truscott Boat Manufacturing Co. of St. Joseph, Mich., has worked up a large export trade in pleasure launches. The Truscott company, as shown by a recent census of the boat industry, is the largest manufacturer of boats under 63 ft. in length on the chain of great lakes and of the hundreds of craft turned out by them every year scores find their way to foreign waters. The factory was founded at St. Joseph in the spring of 1891 by Thomas H. Truscott, who is a descendant of a long line of ship builders, reaching back without a break to the time of Oliver Cromwell. With his three sons, Henry, James and Edward, and a dozen carpenters, he has worked for two years in a rented building and built nothing but small sail boats. The company does in a day now almost as much business as it did the first year. The company has been unusually prosperous. When the plant burned down two years ago they built upon a more capacious basis than ever. The company now manufactures not only the hulls of the boats, but every article in them from the gasoline engines to the pennants. Over 300 workmen are employed. Thomas H. Truscott, the founder of the business, recently retired, leaving his son James M. Truscott as general manager.

CHIME AIR WHISTLES.

A chime air whistle, manufactured by the Gleason-Peters Air Pump Co., a concern that makes a specialty of devices of this kind for yachts and small vessels generally, is illustrated herewith. One of the illustrations shows the whistle with lever and valve connection as it is used



when an air tank is provided; the other, without lever and valve, is designed for hand pump connection. Different designs of whistles of this kind made by the Gleason-Peters company give to small craft that are not provided with steam all the practical advantages of large vessels on this score, in addition to the novelty of the whistles. This company's line of manufacture is varied and interesting. It includes pumps for all purposes where compressed air is required. Pumps for pneumatic wagon tires are installed and factories fitted up with storage tanks for the compressed air; also pumps and receivers for physicians, surgeons, dentists, etc.; hydraulic, hand or power, air pressure pumps for brewers, hotels, etc.; pumps and tanks for blowing yacht whistles and fog horns and for running air brushes for artists, photographers and draughtsmen; vacuum pumps, spray pumps, acid pumps, galvanized iron and drawn steel tinned tanks, copper riveted or soldered tanks, air cocks, pressure gauges, air regulating apparatus, flexible air tubing, and pipe for conveying air to and from storage tanks, nipples, couplings, etc., etc. Pumps, etc., for experimental purposes.

WHY GERMAN LINES LEAD IN FAST ATLANTIC SHIPS.

Andrew Carnegie, writing in the Nineteenth Century as to Great Britain's serious loss of the Atlantic express travel, says a few words will explain why this was inevitable, keeping in view Britain's environment. The British steamship lines sailing between Liverpool and New York convey passengers to and from Britain only, with her 41,000,000 of people. The German lines sailing from Bremen and Hamburg to New York draw first from the whole of Northern Europe, then touch at Southampton and draw part of the British travel, and, not content with this augmentation, crossing to Cherbourg, they draw from Paris and all southern Europe. Thus three fine streams of travel feed their enormous fast ships, the 300,000,000 of Europe are tributary to them, and homeward from America to Germany they draw all who wish to visit or have business with any of these millions, for the homeward ships touch also at Cherbourg, Southampton or Plymouth, and land passengers. Against this the British lines have only tributary to them 41,500,000 of people who desire passage to New York, and, returning from America to Britain, only those Americans who desire to visit the 41,500,000 for pleasure or business. It goes without saying that the German lines must inevitably lead in large, fast steamers. There is no cause for pessimism here, because British ship owners are neither unenterprising nor inefficient; they only show their good sense by recognizing the situation, and will hold more of the profit of Atlantic travel for Britain than if they attempted the impossible.

WIRELESS TELEGRAPHY.

MR. REGINALD A. FESSENDEN REVIEWS MR. MARCONI'S WORK AND SHOWS WHAT THE UNITED STATES WEATHER BUREAU IS DOING.

A few weeks ago the Review published the gist of an address by Signor Marconi to the Society of Arts upon the subject of wireless telegraphy. Mr. Reginald A. Fessenden contributes to the Electrical World and Engineer a reply to Mr. Marconi, showing results which have been obtained by experiments by the United States weather bureau with wireless telegraphy. Mr. Fessenden says:

Even an experimenter working along similar lines and finding a considerable number of devices which he had considered as peculiarly his own, described in the paper, may be pardoned for feeling a considerable degree of pleasure in reading the admirable communication recently made by Mr. Marconi to the Society of Arts. Mr. Marconi is certainly to be congratulated, not only upon the practical results which he has achieved but also upon the beauty of the methods employed. It is most certainly apparent that his method has now passed from the original crude stage to a practical and commercial one. It may be of interest to compare the results, at least some of them (for it would be inadvisable at present to publish more than a part) obtained on this side of the water by the United States weather bureau. These experiments were begun under the direction of the chief of the weather bureau, Prof. Moore, in January, 1900. Under his direction and with his approbation the subject was investigated from the beginning, with a view first to finding out definitely the nature of the phenomena and then devising means for utilizing the forces to best advantage. First will be described a number of cases in which the work of Mr. Marconi and that of the weather bureau has gone along parallel lines; secondly, the differences between the methods and results obtained as far as published, and lastly, an indication of work done by the weather bureau which has not been, so far as is known at present, duplicated. Naturally on account of commercial considerations it will not be possible to go into details so much as might be desired and for the present this deficiency must be excused.

The first point in which parallel results have been obtained is that concerned with the employment of larger capacities, more especially in the form of cylinders. Mr. Marconi describes the use of concentric cylinders, the inner one connected through a self-inductance to ground, and explains very clearly that in the case of wire conductors the oscillations rapidly die away and that with greater capacity we have a more persistent vibrator. The following quotation from one of the patent applications of the weather bureau experiments will show that in this respect the same result has been reached:

"The employment of simple wires having small capacity as sending conductors is objectionable, for the reason that the radiation is so rapid that there are very few oscillations in each discharge, and hence the inductive rise in voltage at the receiving station cannot attain sufficient value to permit of the use of inductive devices for arresting the potential at each station. By the employment of conductors having large capacity at the sending station, and by properly proportioning the self-inductance and resistance, the radiation from the conductor can be so controlled that there will be a large number of oscillations; for example, fifty or more at each total discharge. In other words, the discharge is so controlled that only a small fraction of the total energy is radiated at each oscillation. By thus extending the period of radiation, opportunity is afforded for the inductive voltage at the receiving end to rise to its full value. By increasing the number of oscillations for each total discharge from the sending conductor, and by adjusting the receiving system so that its natural periodicity corresponds, or approximately so, to the period of the electromagnetic waves, the distance of travel of the waves is not solely dependent upon the heights of the sending and receiving conductors as has heretofore been held." And the corresponding claim: "In a system of wireless telegraphy a conductor adapted to radiate electromagnetic waves, having its capacity, inductance and resistance so proportioned that only a relatively small fraction of the energy of the large conductor is radiated during a single oscillation, thereby preventing rapid vibrating in oscillations substantially as set forth."

As regards the details by which this is accomplished Mr. Marconi uses two concentric cylinders, the inner one having an inductance connected with it. The object of the inductance is not fully described, but Mr. Marconi lays great stress upon it. According to the writer's experiments the object of this inductance is three-fold. In the first place, as Mr. Marconi explains, it gives a difference in phase; secondly, it is only the outer conductor which radiates, and this radiates just as a simple cylinder of the same size would radiate if used as an ordinary vertical conductor, but for the fact that the oscillations are more persistent when the inductance is put in. For the formula for logarithmic decrement contains the power, $\frac{R}{L}$, and hence we can decrease the decrement, i. e., render the oscillation more prolonged by increasing L . Also the two concentric cylinders act as a condenser, and this in combination with the inductance means that we really are shunting the spark-gap with a synchronous circuit of larger capacity, as was suggested by Dr. Pupin in his discussion of wireless telegraphy before the American Institute of Electrical Engineers.

In this respect the work has not been parallel, for while the patent application and the drawings described inductances used in this manner, the same effect has been obtained, not by increasing the denominator, but by decreasing the numerator of the fraction $\frac{R}{L}$. This has been done in three different ways which will be described at a later date. The advantage of this method is that whilst when we increase the denominator we decrease the period and also decrease the total amount of energy radiated per oscillation, if we decrease the numerator we keep the amount of energy radiated the same and do not change the period, while at the same time we make the logarithmic decrement just as small as can be obtained with the inductance. This means a greater sending power with a given height.

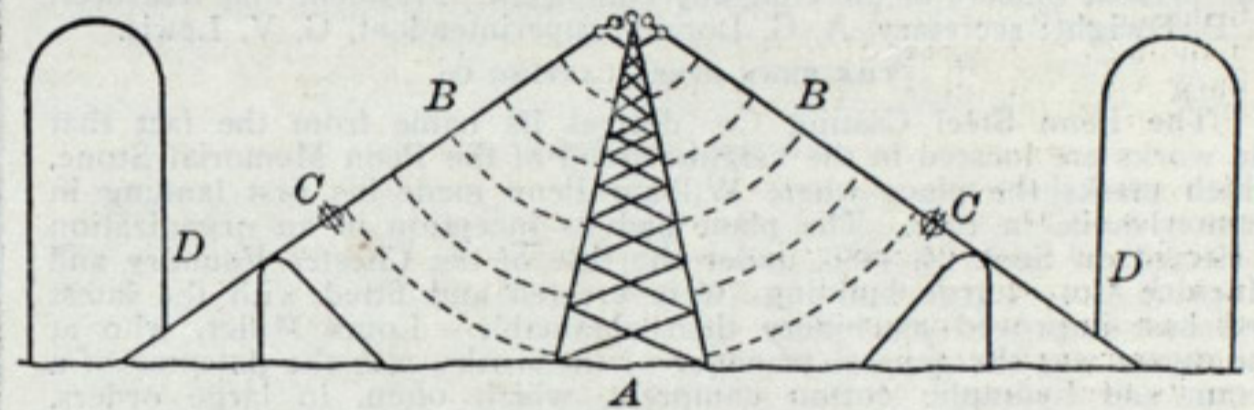
Another line in which parallel results have been obtained is in the tuning of the secondary of the receiving transformer. Mr. Marconi shows clearly the necessity of this, and we may compare this with the following statement from another of the patent applications:

"It has heretofore been impossible to make the receivers respond

solely to waves of one periodicity, as other periodicities, if above a certain power, will affect the receivers. By constructing the second conductor so that the oscillations for each total discharge are increased, and by employing at the receiving station two or more tuned circuits, a very perfect resonance or tuning between the stations can be obtained. With one tuned circuit at the receiving station and with conductors permitting a rapid radiation at the sending station, electrostatic and hysteresis effects become very prominent, and the great self-inductance desirable for sharp resonance cannot be attained. By employing two tuned circuits, one connected to the receiving conductor and the other secondary to the first, the electrical effect in the secondary will occur only when the resonance is very sharp." And the corresponding claim: "In a system of wireless telegraphy a sending conductor in combination with a prime conductor, including the receiving conductor and one or more secondary circuits controlled by the primary circuit; a transmitting device included in the last circuit of the series, the several circuits being tuned to correspond to the period of the second conductor substantially as set forth."

Here, however, there is another difference. Mr. Marconi makes the secondary of his coil equal to the height of the sending conductor. The writer makes it equal to twice the height of the sending conductor. Two explanations of this are possible: First, that Mr. Marconi uses the secondary wound in such a manner that the wire really has a longer natural period than if it were straight; secondly, that he is really working with the first overtone. I have found that the overtones are very pronounced, more especially when the spark length is slightly longer than that generally used. There may be some other cause not at present known, but all the writer's experiments seem to show that the wave length is really four times the length of the vertical conductor and not twice.

Another difference consists in the form of the radiating conductor. Mr. Marconi uses concentric cylinders, but in the weather bureau experiments simple cylinders were at first used. Later these were replaced by conductors of the form shown in the accompanying sketch, in which A is a tower, BB are cables insulated from the tower at its top, CC are insu-



lated strain insulators, and DD ropes boiled in an insulating compound. The spark or other apparatus is placed at the top of the tower and the waves go out, as shown by the dotted lines. This kind was later superseded by a third form, and this kind by a fourth, which will be referred to later.

Another case in which parallel work was done is that in which a Thomson high-frequency coil (commonly called a Tesla coil, but in reality first brought out in its present form by Professor Elihu Thomson) was used. Unfortunately, however, some other modifications are used with it, which, as the patents have not been granted, it will be impossible to describe at present. The writer's experiments show plainly that Mr. Marconi's remarks on Professor Slaby's work are justified, and that much better results can be obtained by the Marconi methods.

Lastly, with respect to the general direction in which the work of the weather bureau has progressed. In the first place, it has been found possible in several ways to get over the old difficulty which troubled Hertz, and later experimenters, i. e., that when the spark length was increased beyond a certain length the discharge become no longer oscillatory. An electrical device was invented which, on being applied directly to the sending wire, measured directly the amount of energy radiated. A curve was then plotted, showing the relation between spark length and energy radiated, and it was found that the curve gave a sharp bend with a spark about one inch in length, and no further increase of radiation could be obtained. Different kinds of coils with different primaries and secondaries, different methods of producing the voltage, different kinds of gases and fluid insulators in which the balls were immersed, and different kinds of arrangements of the terminals were tried, but all without success. But finally the solution was found, with the result that with the later apparatus an amount of radiation sixteen times as great as that got with the ordinary 12-in. coil and 1-in. spark was obtained. This means, of course, greater sending distance, and it may be mentioned here that transmission without the use of transformers, inductive devices, cylinders or any other apparatus for raising the voltage, has been accomplished over a distance of 50 miles without using more than a fraction of the available energy. The same result was also accomplished in two other ways.

The question of high conductors has proved a rather serious one, because, as Mr. Marconi has pointed out, if we use large surface conductors, though they may be short, yet they are objectionable on account of the wind pressure. Means for overcoming this are described in some of the patent applications, but the method was finally abandoned because means have been found by which a conductor only one meter high can be made to radiate as much energy and of the same period as a conductor 100 meters high. Another difference again has been the fact that it has been found necessary to differentiate in form between the receiving and sending conductors, i. e., to have the receiving conductor with more self-inductance and less capacity than the sending conductor.

Other work done by the weather bureau has been along the line of producing a non-interfering system. The admirable and beautiful work of Mr. Marconi has resulted in a system by which within certain limits messages can be sent without interference. But one great objection has been found in the weather bureau experiments to this method, although it is described in some of the earlier patents of the weather bureau experimenters. That is, that while it is no doubt possible, under certain conditions, to send and receive individual messages, yet by connecting two brass semi-circles to a motor revolving at several thousand revolutions per minute, it is possible to make what may be called an electrical siren which runs up and down a scale of seven or eight octaves several thousand times a minutes, and which, as at some period of the scale it

gives a note corresponding to any given syntonized receiver, is consequently able to stop all communication, when used in conjunction with the apparatus for strengthening the radiation, within a radius of 500 miles or so. Consequently this method has been superseded by several other methods which permits of selective signaling, no matter how strong the interfering radiator may be or how close it may be, even approaching the interfering radiator within a few feet producing absolutely no effect.

The parallel manner in which a considerable part of this work has been done may possibly be taken as evidence of the fact that the matter has now got down to a sound scientific base. Mr. Marconi and his eminent collaborator, Dr. Fleming, are certainly to be congratulated on the results they have so far achieved, and no one joins more heartily in wishing them the best of success than the writer. The future of wireless telegraphy in their hands is certainly assured, and it cannot be many years before Mr. Marconi will see the great system which he was the first to see the points of and to put in practical form, in as universal use as our present methods of telegraphy.

THE MIGHTY OCEAN LINERS.

The mightiest and swiftest fleet of merchantmen in the world weaves its way through the deep but devious channel leading to the Narrows, New York harbor's picturesque gate to the sea, writes Samuel A. Wood in *Ainslee's* magazine. The value of these matchless craft is close upon \$150,000,000. More than a third of this amount is represented by twenty-five magnificent twin-screw ships, including the *Oceanic* of the White Star line, the *Deutschland* of the Hamburg-American line, the *Kaiser Wilhelm der Grosse* and the *Kronprinz Wilhelm* of the North German Lloyd line, the *Cunarders* *Campania* and *Lucania*, and the American liners *St. Louis* and *St. Paul*. Besides the immense cargoes that this transatlantic fleet discharges at the great piers of the metropolis, it lands yearly from 125,000 to 140,000 voyagers, mostly returning Americans, in the first and second cabins, and from 350,000 to 500,000 steerage passengers, nearly all immigrants. More colossal cargoes are carried away from than are brought into the port of New York, chiefly in the abysmal holds of mammoth twin-screw carriers like the White Star liner *Cymric*, the Hamburg-American liner *Pennsylvania*, and the North German Lloyd liner *Grosser Kurfurst*.

It is estimated that the cost of all the passenger and cargo carriers in service between Europe and the Atlantic ports of America is close upon \$250,000,000. If the interests of the great lines in the Atlantic, Pacific and interoceanic trades were merged in a maritime trust the actual wealth represented would be not less than \$1,000,000,000. The wealth of the greatest steamship company in the world, the Hamburg-American line, as represented by ships and piers, runs over \$50,000,000. It employs on its fleet about 7,000 persons, and gives employment on land to nearly 9,000. The next line in importance, measured by its wealth, is the North German Lloyd, which, like the Hamburg-American, is capitalized at \$20,000,000. This, however, does not represent more than half the value of its property. Its new piers in Hoboken, which it owns, will have cost, when completed, \$2,500,000. The Hamburg-American line's piers, in the same city, are worth about half this amount. All the other great lines, except the Holland-America, which has its landings in Hoboken, rent their piers from the city of New York. The revenue New York derives from the rental of piers to the Cunard, the White Star, the American, the Atlantic Transport, the French, the Leyland, the National and other lines is nearly a million dollars annually. The White Star line pays the largest rental, \$217,000; the Cunard line is next, with \$120,000, and the American line third, with \$88,131.

Nearly all the famous liners of the world are twin screws. There are, however, a few remarkable single-screw ships which are nearly as swift as some of the great twin screws. Notable among them are the *Cunarders* *Etruria* and *Umbria*, which were launched, respectively, in 1884 and 1885. They did not develop top speed until they had been almost fifteen years in service. The White Star liners *Germanic* and *Britannic*, which were built in 1874, and are, therefore, among the oldest single screws afloat, have made quicker trips from Queenstown within recent years than they did when they were new. The characteristics of the White Star single screws are their steadiness and durability. Representatives of the line say that the *Britannic* will be just as good as she is today probably ten years hence. These ships will doubtless be the last single screws of the White Star line. The single screws have old types of engines that are heavy coal consumers, and, in case of the breaking of a shaft, they are practically at the mercy of the elements. The twin screw is comparatively economical in the use of coal, considering her great speed. Her propellers may be used to steer in case the steering gear gives way, or the rudder is smashed by the slapping of the seas under the counter. There have been several instances when, on account of damaged steering gear or rudder, the twin ship has guided herself nearly half way across seas by her propellers alone.

The value of the screws as an accessory to steering has been frequently demonstrated. The most notable case, in which the Hamburg-American liner *Normannia* (now the French liner *L'Aquitaine*), barely missed destruction by collision with an iceberg, occurred during her maiden trip, on May 27, 1890. The bergs had been drifting down into the steamship lane, enveloped in fog, for several weeks. Capt. Charles Heibich, the commander of the *Normannia*, thought he was steering a course far below the perilous iceberg region. The liner was steaming at the rate of about 17 knots when the lookouts on the fore-castle saw a great three-peaked ice spectre materialize from the mist. Capt. Heibich, who was on the bridge, observed the vision at about the same time that the lookouts forward, shouting warning to the commander, ran aft for their lives. The commander shivered a bit as he pictured the destruction of the ship against the wall of ice. He ordered the helm put hard over. Then he ran to the lever controlling the signal to the starboard engine room and signaled to the engineer to stop the great machine and reverse at full speed. The ship swung as if she were pivoted, just grazing with her port side the precipitous wall of the berg. The port quarter gangway was smashed by thirty tons of ice that toppled on the deck, and some of the plates on the port quarter were bent. Capt. Heibich said that if his ship had been a single screw there would have been little hope for her and the 1,300 souls aboard her. One propeller rushing one way at full speed and the other churning the other way, with the aid of the rudder, turned the ship within her own length.

The first twin screw passenger steamship constructed in Germany was the *Auguste Victoria*, built by the Vulcan Co. in 1889, and since lengthened 60 ft. by Harland & Wolff at Belfast, giving her the aspect of a new ship. Her designers learned their trade in British ship yards, and outclassed their instructors. The Hamburg-American line's fleet consists of 109 ocean craft of about 600,000 tons employed in the North American, South American, Chinese, Japanese and East and West Indian trades. The North German Lloyd's tonnage is more than 500,000. The British line owning the largest tonnage is the Peninsular & Oriental, generally known as the P. & O., which has fifty-eight ships of 313,392 tons, all employed in the East Indian, Australian and Chinese trade. While the tonnage of the world is overwhelmingly British, the Germans are making an effort to drive the red merchant ensign from many seas, and their steam tonnage is growing with wonderful rapidity. They imported most of their tonnage less than two decades ago, chiefly from British yards. They have now seventeen great ship building yards, employing 51,000 workmen. The output of the yards is constantly increasing, and they have been taking on new men at the rate of two or three thousand a year. Mr. Lockroy, former minister of marine in France, declared recently that he believed Germany would become eventually the greatest ship building country in the world, because of the fostering care of the government, its energy in improving its harbors and the natural and artificial advantages of the country.

The British ship builders themselves do not seem to fear German competition as much as they do that of the United States, which is re-assuming its ante-bellum glory as a builder of ships, not only for Americans, but for the outside world. It is almost an axiom that the merchant marine of a nation increases in proportion to her development as a naval power. This is true of the United States. A number of her new ship yards were started chiefly to get the contracts for constructing naval vessels, for which Uncle Sam pays with unsurpassed liberality, provided all requirements are fulfilled. Less than 10 per cent. of the American exports are carried in American bottoms, and there are only about 100 American steamships in the foreign trade. The largest of these, the *St. Louis*, *St. Paul*, *Philadelphia* and *New York*, belong to the International Navigation Co., better known as the American line. The *St. Louis* and *St. Paul*, built by the Cramps, of Philadelphia, are the swiftest merchantmen flying the Stars and Stripes. They are economical coal consumers and steady ships in a gale.

It was printed frequently just after the swift *Cunarders* came out that they were not paying ships. This was believed by representatives of the German lines, but it is not so. The sea express—even so mighty a coal consumer as the *Deutschland*—does pay, and pays well, in the season when traffic is heaviest on the Atlantic. It is estimated that it costs the Hamburg line about \$45,000 to run the *Deutschland* across seas. The largest item of expense is that of coal. She sends through her four monumental funnels every trip vapor representing \$5,000. Then there is the bill for lubricating oil, and the cost of the ship's immense laundry. In the seasons when the cabins and the steerage are crowded, the ship's washing usually consists of nearly 24,000 pieces, including table linen, blankets, sheets and the coats of the stewards. The laundry bills for a single trip vary according to the number of passengers carried, from \$300 to \$500. There are only two ships in service that do their washing aboard—the cruising yacht *Prinzessin Victoria Luise* and the excursion steamship *Auguste Victoria*, both of which have electric laundries. Next to the cost of coal is the expenditure for wages. The board of the *Deutschland's* crew of 557 persons, the cost of providing her 700 or more cabin passengers with meals, the wages of the commander, her officers and the chief engineers help to swell the list of expenses. The commanders of the German ships receive more pay than those of either the American or British lines. Aside from their regular wages, which range from \$1,500 to \$4,000 a year, they have a share in the earnings of their ships. On the British lines the captains receive from \$1,500 to \$6,000 a year, with perquisites. If, at the end of the year, a British commander's ship has met with no accidents, he gets a bonus. The British lines think this system of reward has a tendency to make commanders more careful. The pay of an engineer on the German lines ranges from \$1,200 to about \$2,500 a year. The pay of the British engineer does not differ materially from these figures, but he also receives a bonus if his engines run without accident during the year.

DIFFICULT WORK AT SEA.

A special dispatch from Victoria, B. C., says that the officers and crew of the Norwegian tramp steamer *Guernsey* succeeded in performing a difficult job of repairs at sea. Losing their propeller and shaft in mid ocean they shifted the cargo until the stern of the boat was tilted high in the air and then put in a new propeller and shaft. The captain of the *Kaga Maru* reported at Victoria that he sighted the *Guernsey* July 1 far out in the Pacific. Her captain came alongside and said they had broken their tail shaft and lost their propeller. Fortunately, under regulations of the underwriters which compel such vessels to carry an extra shaft and propeller, these were on board, but the difficulty of shipping them was so great as to appear almost insurmountable. Favored by calm weather and quiet-sea, however, the captain decided to make the attempt. The ship being in ballast, her cargo was moved forward until her bow was deep in water and her stern was elevated with the propeller shaft clear of water. Rafts were improvised and a nine-ton propeller lowered. The propeller shaft was placed in position without great difficulty, but the swell of the ocean and crude appliances at hand made the task of shipping the screw very difficult. Repeated attempts only resulted in failure, until finally by the skipper's orders two opposite blades were cut off. Thus lightened, the screw was at last got into position, and Capt. Kroghanson expected to get under way with his dual bladed propeller the next day. The *Kaga Maru* was detained for about an hour and a half by the incident, when, as she could be of little service, she steamed away.

The Clyde line steamship *Comanche* has been taken to Cramps, Philadelphia, where she will be cut in two and lengthened 48 ft. She is at present 326 ft. in length and 42 ft. beam.

Green's ship yard, Bridgeport, Conn., is building a four-masted schooner to be known as the *Perry Setzer*.

BURDENS OF ENGLISH MANUFACTURERS.

The Review had occasion last week to call attention to the fact that Andrew Carnegie and Arthur Chamberlain had made speeches in England encouraging the English manufacturer and telling him not to fear American competition in spite of the superior natural advantages. We are now enabled to give the greater part of Mr. Chamberlain's speech, which was delivered at Birmingham. The competition of Europe and the United States he regarded largely as the bogey of politicians and newspaper paragraphists. For him it had very few terrors. Individual businesses, no doubt, waxed and waned, but British manufacturers were never as a whole, it appeared to him, more confident, more energetic, more successful, and—perhaps he ought to say this in a whisper—more wealthy. He should be the last to deny that foreign competition had its dangers and foreign competitors their advantages, but the restrictive tendency of modern legislation had more terrors for him than all the competition of the foreigner. The United States no doubt had its advantages. Its chief advantages he took to be a protected home market with about double England's population and a large measure of freedom to work out their own ideas without all that grandmotherly legislation from which the British manufacturer suffered. The home market was the mainstay of every manufacturing industry. Unless they had a large demand for their products at home they were not in a position to compete successfully with anyone abroad. There was no doubt protection was a great advantage to the manufacturer and, therefore, a great advantage to their competitors in the United States. He did not say protection was an advantage to the country, but he was sure it was an advantage to the manufacturer of any country. What happened to the agriculturists, the professional classes, the consumers, was no affair of his, but that protection would give manufacturers largely increased opportunities of making profit he was perfectly sure. Therefore he realized that in England they suffered in proportion from the absence of a protected market at home, and that, although he did not specially complain of it, it ought to be borne in mind by their critics when they referred to the occasional success of their rivals. He did not consider that England suffered any disadvantage by reason of deficient education. As a matter of fact, he would not exchange Birmingham workpeople for those of any other country on the face of the earth. He could not help thinking that the craze for education would disappoint its votaries. There was a tendency in it to spoil good workmen in order to make bad managers who were not wanted. For ninety-nine out of every 100 the workshop was the best and cheapest education. There was only room under modern conditions for a very few experts and for still fewer masters, and those who were endeavoring consciously or unconsciously to make all masters were endeavoring to rear a cone on its point.

There was an immense amount of talk and writing, and it was extraordinary to notice how small a part the real English manufacturers took in the discussion. The politician, the philanthropist, and the newspaper man told them how ignorant, how depressed, and decadent they were, but the manufacturers kept silent, they paid the income-tax, and the income-tax continued to increase. True they suffered from disadvantages from which their competitors were free, but they were disadvantages which were due to the same politicians and philanthropists, and in spite of them there never was a time in the history of the country when the manufacturers found employment for so many people, nor when they paid on the whole such high wages nor when they made on the whole such large profits. Who were the manufacturers who were depressed? Was it the coalmasters? Surely not. Was it the ironmasters? Only a year or two ago they were having the best period they had ever had in their history, or at all events for a long time. Was it the ship owners, was it the engineers, of whom it was complained that they were so busy that they could not execute orders in a reasonable time? Was it the electricians or the chemical manufacturers? As a manufacturer he moved among manufacturers, but he could not meet with the manufacturers of whom he read in the newspapers as being depressed and unable to meet the competition of the world. It was true they had burdens and he would call attention to two burdens from which they suffered in a greater degree than their foreign competitors. They suffered from railway rates and strikes, but he thought manufacturers were quite capable of managing these matters for themselves without outside interference, but the burdens they were incapable of dealing with were imposed on them from outside.

The first burden was the constant interference with methods and management that was now introduced by parliament and the local boards. The cost of all they bought unless they bought abroad, and the cost of all they made and of all that they sold, whether they sold at home or abroad, was largely increased by harassing legislation. They were inspected to death, and they were hampered at every step. As an instance, electric tramcars and tram-lines and the electric industries generally had been largely strangled by the interference of the home office and the local boards, and as the result they had to go to the United States, where the industry had been allowed to attain its full power, for information as to the best machinery and the best methods in that department of industry. This was due to no deficiency on the part of English manufacturers, but to the interference of parliament and local bodies. The effect was to destroy initiative, to discourage invention, and to diminish the sense of individual responsibility. There was no amount of education, no amount of book-learning that would make up to the people for the loss of grit that was caused by all this outside nursing and interference with them. The other burden was the great and increasing rates. The rates, for whoever's benefit they were levied, were certainly not levied for the benefit of the manufacturers. He could not find that the local rates they paid were the slightest use to them. The company paid in England over £2,500 a year in local rates. In Ireland they paid for the same rates £80 a year, yet for manufacturing facilities and for the health and comfort of their workpeople they were not a penny the worse off where they paid only £80 than in England, where they paid considerably over £2,500. He pointed out that in addition they also paid the rates of their workmen's houses, but added that the money loss on rates was nothing as compared with the burden of official interference. He compared the cost of manufacture forty years ago, when the competition of the foreigner was not regarded as of the slightest importance, with the present day. What economies could be effected if the manufacturer could carry on his business free from local boards and by-laws, free from sanitary inspectors,

free from smoke inspectors, free from chemical inspectors, free from school board inspectors, free from home office inspectors, and factory inspectors—free from the whole brood of officials who, not being producers themselves, lived on the produce of manufacturing industry and strangled it. The irony of the position was that these very politicians and philanthropists who had imposed all these burdens on them were now asking why they could not compete as they used to do with freer nations. Lord George Hamilton said the explanation was the deficient education of the manufacturers. It never occurred to him to find it in the mischievous activity of legislators, of whom he was a conspicuous ornament. At this time of day it was useless to ask that this legislation might be repealed, but they might ask that its progress should be stopped. Nor was it too much to ask that it should be taken into account in comparing their work with that of their competitors, and at least those local bodies who were responsible for so much of the burden should remember it before they placed with the foreigner orders that were required for home consumption. The Newcastle corporation had just bought 1,000 tons of American rails because they were 3d a ton cheaper than those made in the North of England. They effected a saving of £12 10s. on the order, but he asked his hearers if they did not think that a great deal more than this was represented to the British manufacturer by outside interference. He thought the railway companies might consider when they placed orders for locomotives abroad on the score of cheapness how far their rates and charges were responsible for some of the cost in the English manufacturers' locomotives.

He had pointed out what he considered to be the real dangers to British manufacturing supremacy. Surely it was not much to ask that they should be let alone. At the same time, he did not admit that up to now there was anything to give them cause for anxiety, so great was the energy and industry of the English manufacturer, and so superior the people who worked for him. If the loss of British manufacturing prestige should ever occur it would be due to the comparative freedom enjoyed by the foreigner and to the continually increasing restrictions that were suffered by manufacturers in this country.

FAMOUS LIGHT-HOUSES AND LIGHT SHIPS.

(From the Boston Herald.)

Among other government enterprises Uncle Sam is in the light-house business, and, like everything else that he touches, he has developed it to a remarkable extent, for, when he took over the light-houses from the different states in 1789 their number was only eight. Now he has about the biggest stock in trade of any government in the business. He has a tremendous coast line to light. It figures up 9,959 miles, including the great lakes, exclusive of the Ohio, Missouri and Mississippi rivers, and he maintains more than 2,000 lights and about 4,500 fog signals, buoys, monuments and beacons, which are summed up under the general term of unlighted aids to navigation. The light-house board of the United States, which is charged with the supervision and care of all these, ranks high among the light-house establishments of the world. Probably, in point of practicability, smoothness, of administration and readiness to adapt itself to any emergency which may be presented, it is first among all light-house establishments. Certainly none other has had so many varying problems to meet, for in the planning and erection of light-houses our enormous coast line has presented many different conditions of locality.

There are light-houses and light-houses, and the light-house board has had to determine just what kind of light-house would do for each particular point, and in perfectly adapting each structure to its site the light-house board of the United States probably has been obliged to erect more different kinds of light-houses than the establishment of any foreign government. The solid granite structures of the New England coast would never do for the submerged coral reefs of Florida or for the jetties of the Mississippi; nor, on the other hand, would a lantern hung by a nail from a tree, which actually constituted for many years one of the lights of the Mississippi river, suffice for the precipitous cliffs of the Pacific. In fact, in order to thoroughly and systematically light the coast of ocean, gulf, lake and river, our light-house board had to apply an enormous amount of scientific thought in solving many difficult problems.

On the coast of Maine is a series of lights built on rock and of native granite. The sites and the material were on hand, like coal and iron in Pennsylvania. These light-houses are extremely beautiful features of the coast. With their gracefully sweeping lines, which, however, do not interfere with the impression of solidity; with the original gray deepened by the stain of numerous storms, the brunt of which they have gallantly sustained, they seem to have grown out of the very rocks on which they rest. Among the most typical of these Maine light-stations are the twin towers on Matinicus rock, far out in the entrance of Penobscot bay. Rugged though their aspect is, they have been the scene of one of the prettiest love romances in the annals of the service. In 1861 the then keeper, Capt. Burgess, was relieved by Capt. Grant, who brought a son with him as an assistant. Capt. Burgess had a daughter named Abby, who for many years had helped him in the care of the lights, and was perfectly versed in everything pertaining to them. During one winter, when Capt. Burgess had gone over to Matinicus island for supplies, a severe storm sprang up, and lasted so long that for several weeks he was unable to get back. His wife was an invalid, and during this trying period Abby, then a mere slip of a girl, not only tended the lights, but looked after the comfort of her invalid mother and several younger brothers and sisters, cheering them up during the stormy days and nights. When Capt. Grant and his son came to the rock Capt. Burgess left his daughter, Abby, there to assist the newcomers awhile and instruct them regarding certain peculiarities of the lights. Perhaps it is not at all strange that the younger Grant proved a very apt pupil, for Miss Abby was a very attractive teacher—so attractive, in fact, that when her pupil had learned to take care of the lights he persuaded her to allow him to take care of her for the rest of her life, a proposition to which she assented. Including the eight years she had already been on the rock and the subsequent period she remained there with her husband, it was her home altogether for twenty-two years.

The most famous light-house on the American coast is that on Minot's ledge, off Cohasset, on the coast of Massachusetts. It is the American Eddystone, for Minot's ledge light-house rises right out of the sea. The rock which forms its foundation is entirely submerged, and in a northeasterly storm the light-house is absolutely exposed to the full force of the Atlantic ocean. The first light-house which was erected on

the site, in 1848, was built on iron screw piles, and in a furious storm which burst over the coast in 1851 it was overthrown, and the two keepers on it perished. This was the greatest tragedy in the history of the American light-house administration. The present granite structure was begun in 1855, and finished in 1860. Owing to the exposure of the site work could be carried on there only during the summer, and even then there were two summers when only 130 working hours could be had.

However, life on Minot's ledge is agreeable, compared with existence on the Nantucket shoals light-ship, which is 43 miles out at sea from Sankaty Head, Nantucket. This light-ship is a tossing, rolling island, entirely out of sight of land, and the crew are cut off from friends and family for eight months during the year. Words are almost inadequate to describe the constant motion of this vessel. Being anchored over the shoal, she is as helpless as a dismantled hull at the mercy of wind and waves. She simply reels and rolls and staggers around her moorings. Now she is on the crest of a tremendous wave, now plunging into the valley, now rearing up on her stern, now pitching forward, now rolling—never for a moment, apparently, on an even keel.

On the Long Island and Jersey beaches and on some of the southern sands are the tall and graceful structures of which the Fire Island, Barnegat and Bolivar (Texas) beacons are good types. The Carysfort reef light-house, off the Florida coast, is a typical coral reef light. It is built on screw piling, which is screwed down into the submerged coral and forms a skeleton foundation for the platform, on which rests the keeper's dwelling, and for the iron cylinder, which rises above this to the watch room and the lantern. A somewhat different type of screw pile light is the Northwest reef, while the South Pass is interesting as being built on one of the famous jetties at the mouth of the Mississippi river.

The most noted light station on the Pacific coast is that of Tillamook rock, 70 miles south of the mouth of the Columbia river, Oregon. The rock rises in isolation to a height of 92 ft. above the sea, yet the spray of breaking waves often is hurled higher than the summit, and the sea around the base of the rock usually is so turbulent that the keeper has to be lowered in a cage or basket and suspended in mid-air over the water to report to the visiting light-house tender on the condition of himself and his assistants. During one heavy storm a wave loosened two pieces from the side of the rock near the summit, and hurled them on the roof of the keeper's dwelling. The weight of these fragments and of the wave tore a large hole in the roof, and the wave flooded the building and knocked down two interior walls, throwing three rooms into one. The focal plane of the lantern is 136 ft. above the sea, yet during the storm loosened pieces of rock broke eleven panes of glass 3 ft. long and $\frac{3}{8}$ in. thick, and the light was put out by the waves.

Such are some of the experiences which the keepers of lights on the exposed stations of the United States are obliged to pass through. In all emergencies they bear themselves bravely. They are heroes of peace, and Uncle Sam may well be proud of the nephews and nieces who tend his lights.

OUTPUT OF MAINE SHIP YARDS.

SUMMARY FOR THE FIRST SIX MONTHS OF 1901—VARIOUS ITEMS FROM SEABOARD YARDS.

In the first six months of 1901 Maine ship yards turned out about 25,000 tons net and 28,000 tons gross of new vessels, which indicates that the total for the year will be in excess of that of 1900. The New England output is, of course, largely of wooden vessels. The returns for the six months ending June 30 show that Bath has launched 23,865 tons gross of all classes of vessels, while other ports have launched 5,000 tons, the latter mostly wooden vessels of the schooner kind. Bath's new list includes ten schooners aggregating 12,000 tons; seven barges, 7,684 tons; one ship, 2,288 tons; one tug, 650 tons; one steamer, 153 tons. The single ship in the list is the Acme, a steel four-master for the Standard Oil Co. Some of the barges—the Cardenas, Matanzas, Havana and Sagua—are among the largest wooden vessels of that type ever built, carrying 3,000 tons of coal each. They are for the coal trade of Philadelphia to Cuba, and a steel tug, the Cuba of 650 tons, has been built expressly to tow them. Vessels now under construction at Bath include the steel ship William P. Frye, about 3,000 tons; five schooners aggregating about 8,500 tons; the United States monitor Nevada, the cruiser Cleveland, the torpedo boat Biddle and some lesser craft, while the Bath Iron Works has contracts for the battleship Georgia and a large steel yacht for A. S. Bigelow of Boston. At other ports in Maine—Waldboro, Rockland, Camden, Belfast, Bucksport, Millbridge and Machias—large schooners are in process of construction and the aggregate of merchant tonnage now on the stocks is not far from 20,000 tons.

The Tacoma Ship Building Co., Tacoma, Wash., has secured a contract from E. J. Dodge of San Francisco, Cal., for a steam schooner, complete except machinery, of following dimensions: Length keel, 150 ft.; beam, 34 ft.; depth, 12 ft. She is to be used as a lumber carrier and is to be delivered Oct. 15. Mr. John B. Hardy of Tacoma has just finished the machinery for the steamer Defiance. Mr. Hardy says the Defiance is the best small vessel that has yet been built on the Sound. She is fitted for a passenger and mail route, with small freight space. Dimensions are 102 ft. by 22 ft. by 8 ft. The hull was built by Crawford & Reid. Engines are triple expansion with cylinders of 10, 16 and 25½ in. diameter by 16 in. stroke. The boiler is of the Scotch marine type, 7 ft. 6 in. by 10 ft. The speed is to be 14 miles an hour.

Nearly \$2,000,000 is now available for expenditure in improvement at the Charlestown navy yard. This estimate is exclusive of over \$1,000,000 which is now being spent in constructing the immense new dry dock. The contemplated improvements include a complete set of manufacturing shops fitted with modern machinery, a system of fire protection, new lighting, heating and drainage systems and new piers.

BELLEVILLE GENERATORS

Grand Prix 1889
Originated 1849

Hors Concours 1900
Latest Improvements 1896

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895.....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900.....	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
Total.....	757,503	713,637	644,784	597,423	387,519	356,376	292,683	209,514	172,182	128,730	85,950	52,140

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.

WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS · BELLEVILLE, SAINT-DENIS-SUR-SEINE.

SPECIAL TYPES OF BERTHS FOR SHIPS.

A special type of steamship berth, made by Lein, Irvine & Co. of No. 328 East Twenty-third street, New York, is illustrated herewith. This is not, of course, the berth of most elaborate design made by the New York firm, as they provide high-grade brass beds and most elegant berths for the finest of transatlantic liners, but this type is especially suited to ordinary quarters on passenger vessels. It is now being fitted in two



vessels for the Old Dominion line. Lein, Irvine & Co. make first-class cabin berths, portable cabin berths, immigrant berths, deck berths, transport bunks, etc., and also make hospital beds and cots of approved design. They make a specialty of berths and beds suited to hot climates. They equipped several of the army transports, as well as the battleships Kentucky and Kearsarge and several of the torpedo boats, and are now at work on a large order for the equipment of the Pacific liners Korea and Siberia, building at the works of the Newport News Ship Building & Dry Dock Co.

One fare for the round trip to the Pan-American exposition at Buffalo via the Nickel Plate road beginning June 1 and continuing the entire summer; good returning within ten days from date of sale. Write, wire, 'phone or call on nearest agent, or E. A. Akers, C. P. & T. A., Cleveland, Ohio. 84, Aug. 1.

"Seaboard Steel Castings."

MANUFACTURERS OF
"THE ADMIRAL" ANCHOR.

THE LATEST AND BEST
STOCKLESS ANCHOR.

APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON
ORDER, OR STOCK ORDERS
PROMPTLY FILLED.

A GUARANTEE OF QUALITY.

OPEN-HEARTH STEEL CASTINGS
OF THE HIGHEST GRADE.
FACILITIES FOR CASTINGS UP TO
80 000 POUNDS WEIGHT.

MACHINE WORK AND PATTERNS
FURNISHED WHEN REQUIRED.

RAIL OR WATER DELIVERIES.

CAPACITY, 1500 TONS PER MONTH

Seaboard Steel Casting Co.,

CHESTER, PA.



"BENEDICT-NICKEL" SEAMLESS TUBING
FOR CONDENSER TUBES

Contains NO ZINC
nor any weaken-
ing metal.

Send for Booklet with
treatise on "Electrolysis
of Condenser Tubes."

Benedict & Burnham Mfg. Co., Mills and Offices, Waterbury Conn.
New York, 253 Bd'wy. Boston, 172 High St.

TRADE NOTES.

The Cleveland Pneumatic Tool Co. has opened a New York office at No. 15 Cortlandt street, in charge of W. F. McGuire, where samples of their complete line of chipping, beading and caulking hammers, the Cleveland long-stroke riveting hammers, piston, rotary and breast drills can be seen.

An Astoria, Ore., dispatch says: It is learned that the Columbia Dry Dock Co., capitalized at \$1,000,000, is backed by the Simpson Dry Dock Co., New York. The New York company is said to have placed all the stock and will build and operate the dock. Several months ago Mr. Simpson visited Astoria with T. B. Hammond and at the time selected the location on which the plant will be erected.

A. Wells Case & Son, Highland Park, Conn., manufacturers of the Case outward thrust propeller wheel, report very favorable results from a large wheel which they made recently. They took off a 12½-ft. bronze wheel, which was replaced by a 12-ft. iron wheel of their make, and they are informed that the change has resulted in a reduction of vibration with a gain of 2 miles an hour in speed. They have just taken an order for two 8½-ft. wheels for a steam yacht.

At a meeting of the board of directors of the Allis-Chalmers Co., held in New York last week, it was decided to invest \$1,250,000 in a new engine plant on the Atlantic coast. President W. J. Chalmers is reported to have made the following announcement: "I cannot say at present where the shops will be located, since negotiations for the proposed site have not been completed. They will be where shipping facilities are within easy access, however. It will be a great saving on freight rates in foreign shipments. We can also get our material from Pittsburg more easily. In Chicago we have been unable to secure protection even from the courts in time of labor troubles."

A new chart, in colors, of Erie harbor and Presque Isle, has just been issued and may be had from the Marine Review. A new chart of Buffalo harbor and Niagara river to the falls is also in print.

Some interesting reading matter relative to very shallow draft powerful steamboats for river navigation is mailed free on receipt of request by Marine Iron Works, station A, Chicago. 5

BURNISHINE.

THE MOST MARVELOUS METAL
POLISH IN THE WORLD.



In Liquid and
Paste Form.

Will Polish

Hot or Cold

Metal,

no matter which.

Produces a wonderfully brilliant
lustre on brass, copper, nickel and
all metals, no labor required.

Used on steamers all over the world.
Free samples on application.

J. C. PAUL & CO.

57 Dearborn St.,

CHICAGO, ILL.

It is up to you
Mr. Engineer.

We have shown you time and again in
the advertising pages of the leading en-
gineering journals that we are the manu-
facturers of

High Grade Packings

for every purpose. They are reliable, dur-
able, economical and guaranteed. All we
ask is an opportunity to convince you of

THESE SOLID FACTS.

Will you give us that opportunity?

Send for catalogue and samples to our nearest office.

THE GARLOCK PACKING CO.

NONE
GENUINE



WITHOUT
IT.

New York.
Boston.
Chicago.

Philadelphia.
Pittsburg.
Cleveland.

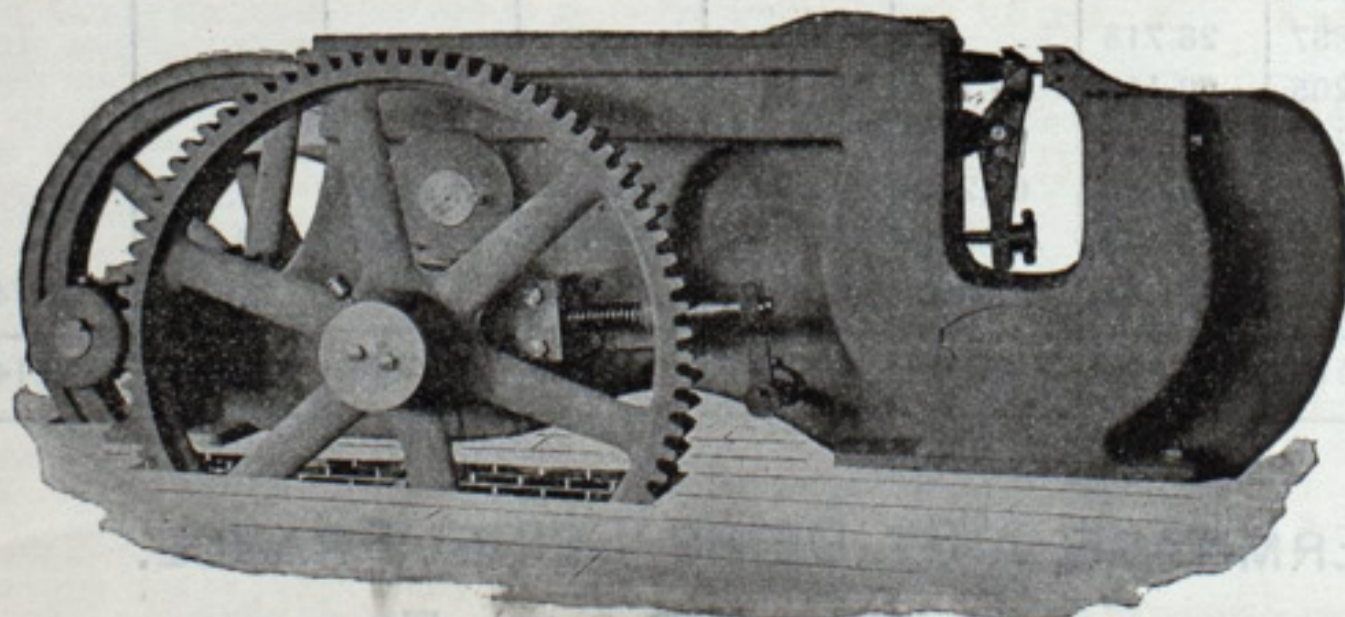
St. Louis.
Denver.
San Francisco.

MAIN OFFICES AND FACTORIES:

PALMYRA, N. Y.; ROME, GA.

THIS ILLUSTRATES OUR

HORIZONTAL PUNCH

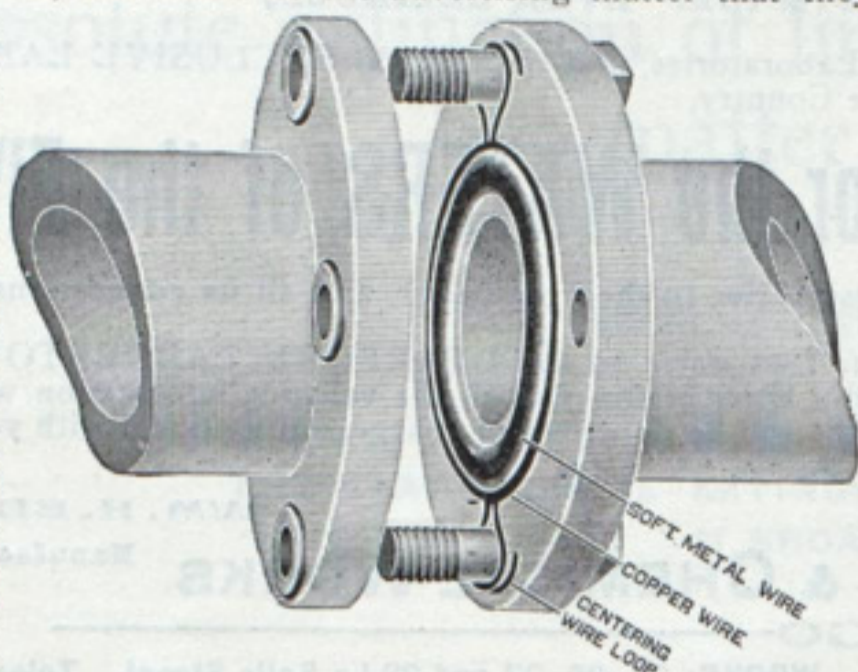


which is a very useful tool in any shop, and is especially designed for punching angles, channels, beams, and flanges of boiler heads. This punch is equipped with our regular punching attachment and automatic stop, and is built in several sizes of throat from 6 in. to 40 in., with capacities from ⅜-in. hole through ⅝-in. plate to 1¼-in. hole through 1-in. plate. We can satisfy you that we have the best horizontal punch on the market, and will be pleased to correspond with you if you are in need of such a machine.

The Cleveland Punch & Shear Works Co., CLEVELAND, O.
U. S. A.

MERWARTH METALLIC GASKET.

The Merwarth Metallic Gasket Co., 107 Liberty street, New York, are extensive advertisers, and much of the advertising matter that they send out is attractively gotten up. Attached to a card that will admit of mailing in an ordinary envelope they send samples of small gaskets. They agree to fill trial orders on the understanding that the gaskets are to be returned if they fail to meet requirements. Gaskets are made for any size or design of joint. Parts of the gasket are designated in the illustration. As pressure is applied to draw the flanges together the soft metal squashes into inequalities on the faces of the flanges and the copper ring holds it squashed; "squashed to stay squashed," say the manufacturers, "and tight to stay tight." The first cost, 4 cents per diameter inch of gasket delivered at destination, is said to be less than that of good rubber. In a paragraph referring to the difference between expansion and contraction of the metals in the gaskets the manufacturers say: "Figure out the expansion and contraction of your copper ring, 1-32 in. thick; compare with expansion and contraction of the 2 in. or 3 in. of bolts holding the flanges together, and then think: 'Does the tail wag the dog?' If the bolts do their work the gaskets will not be found wanting. Look to your bolts when you have a leak—the gasket is all right. If the bolts are squeezed up tight enough you will have a joint that will set tight. If the bolts are not tight enough keen on tightening. The gasket will stand it without a murmur."



As pressure is applied to draw the flanges together the soft metal squashes into inequalities on the faces of the flanges and the copper ring holds it squashed; "squashed to stay squashed," say the manufacturers, "and tight to stay tight." The first cost, 4 cents per diameter inch of gasket delivered at destination, is said to be less than that of good rubber. In a paragraph referring to the difference between expansion and contraction of the metals in the gaskets the manufacturers say: "Figure out the expansion and contraction of your copper ring, 1-32 in. thick; compare with expansion and contraction of the 2 in. or 3 in. of bolts holding the flanges together, and then think: 'Does the tail wag the dog?' If the bolts do their work the gaskets will not be found wanting. Look to your bolts when you have a leak—the gasket is all right. If the bolts are squeezed up tight enough you will have a joint that will set tight. If the bolts are not tight enough keen on tightening. The gasket will stand it without a murmur."

\$13.50 TO ATLANTIC CITY, N. J., AND RETURN.

From any point on C. T. & V. R. R., July 18 and August 15. Tickets good twelve days and for return will admit of stop-over at Washington on return trip. Apply to any agent, or J. E. Galbraith, traffic manager, C. T. & V. R. R., Cleveland, O. Aug. 8.

Low rates to Milwaukee via B. & O.—account Grand Lodge B. P. O. E. Tickets on sale July 21 to 23, available for return to August 10. For particulars call city ticket office, 241 Superior street. July 18.

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., June 26, 1901. Sealed proposals for Repair of Piers at Manistee, Mich., will be received here until 3 p. m., July 26, 1901, and then publicly opened. Information furnished on application. Charles Keller, Capt., Engrs. July 18.

FOR SALE.

BALANCED COMPOUND MARINE ENGINES carried in stock for immediate delivery—20 to 200 horse power. Full line of patterns for larger sizes and quadruple expansion engines, insuring quick delivery. Highest economy and speed.

NO VIBRATION. Contracts taken for complete plants.

July 25.

WELLS ENGINEERING CO., 136 Liberty St., NEW YORK, N. Y.

FOREMAN WANTED.

Wanted: Foreman for steel construction shop. One who is a first-class fitter and who understands, thoroughly, boat construction and the use of modern tools as applied to yachts of 30 to 150 ft. length. Must be competent to handle men and work himself when necessary. A good place for an experienced hustler. Racine Boat Mfg. Co., Racine, Wis. July 11.

AN OPPORTUNITY—MARINE ENGINE.

The undersigned have for sale, in good condition, a second-hand Wells' Balanced Quadruple Expansion Engine. Size 8 in., 12 in., 16 in. and 24 in. by 18 in. stroke. Price \$1,000. Full description upon application. Fore River Ship & Engine Co., Quincy, Mass. July 18.

TUG FOR SALE.

Wood hull 61 ft. long, 14 ft. 8 in. beam. Iron house. Engine 16 1/4 by 18 in. Boiler pressure allowed, 140 lbs. Price \$2600. Inquire C. H. Strong & Son, No. 622 Cuyahoga building, Cleveland, O. July 25.

A New Locomotive Fire-Box Marine Boiler

For sale for immediate shipment. Shell 66 in. diameter. Fire box 84 1/2 in. long, 89 in. high, 64 in. wide. Contains 237 2 1/4 in. by 17 ft. iron tubes. Steam drum 36 in. diameter, 11 ft. long. Working pressure, 200 lbs. Built to pass government inspection. Detailed specifications on application. The S. Freeman & Sons Mfg. Co., Racine, Wis. tf

STANDARD SEAMLESS TUBE CO.

MANUFACTURERS OF

Seamless Cold Drawn Steel Tubing

IN ALL SIZES FROM 1/8 TO 16" DIAMETER.

Stay Tubes,
Water Grates,
Compressed Air and
High Steam Pressures.

Boiler Tubes

FOR ALL CLASSES
OF MARINE WORK.

Hollow Shafts,
Bushings,
Hydraulic Tubes,
Etc., Etc.

NATIONAL TUBE COMPANY,

SELLING AGENTS,

SALES OFFICES:

Havemeyer Building, New York.
Conestoga Building, Pittsburg.
Western Union Building, Chicago.

95 Milk St., Boston.
267 So. Fourth St., Philadelphia.
420 California St., San Francisco.

FOREIGN OFFICE:

Dock House, Billiter Street,
London, E. C., Eng.

Dearborn Vegetable Boiler Compounds.

SCIENTIFICALLY AND UNIFORMLY MADE. EVER RELIABLE.

Most Scientifically equipped, Complete, Handsome and expensively Furnished Laboratories, and the ONLY EXCLUSIVE LABORATORIES ON STEAM ECONOMY in the Country.

MARINE FORMULA NO. 5, For the WATERS of the FIVE LAKES.

To prevent pitting, neutralize the oil, stop incrustation, and as a perfect preservative to the iron, boiler, and all its connections—especially prepared for the marine trade of the lakes.

If you are using a different water, prepay the express on a gallon jug of your feed water to the DEARBORN LABORATORIES at CHICAGO and receive a copy of analysis of same, with a written diagnosis of your case, and a letter giving you all the valuable information we can, and the actual cost of what it will require to clean your boilers and keep them clean. All of this will be done free of charge, and optional with you whether you order or not. When in Chicago call and inspect our Laboratories.

Analyzers of Everything.

Makers of Boiler Compounds.

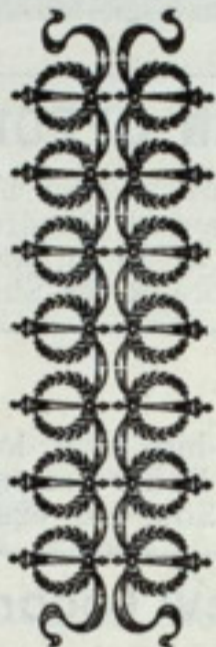
DEARBORN DRUG & CHEMICAL WORKS
CHICAGO

W.M. H. EDGAR, President.

Manufacturing and Analytical Chemists.

OFFICES: 29, 30, 31, 32 and 33 Rialto Building. Telephone, Harrison, 1373.

WORKS: 23, 25, 27 and 29 La Salle Street. Telephone No. 1130 South.



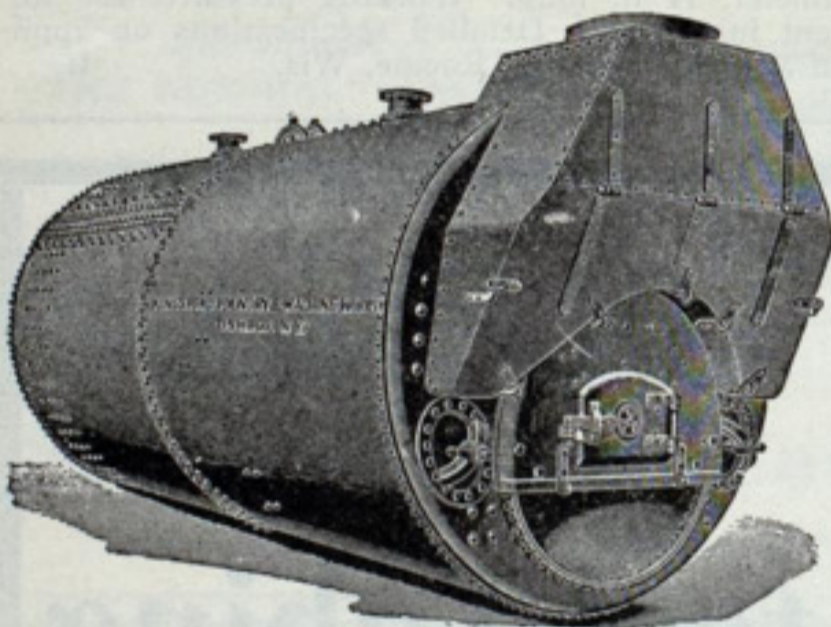
CRAIG SHIP BUILDING CO.

TOLEDO, OHIO,
METAL & WOODEN SHIP BUILDERS.

New Dry Dock—450 feet long, 110 feet wide on top,
55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships

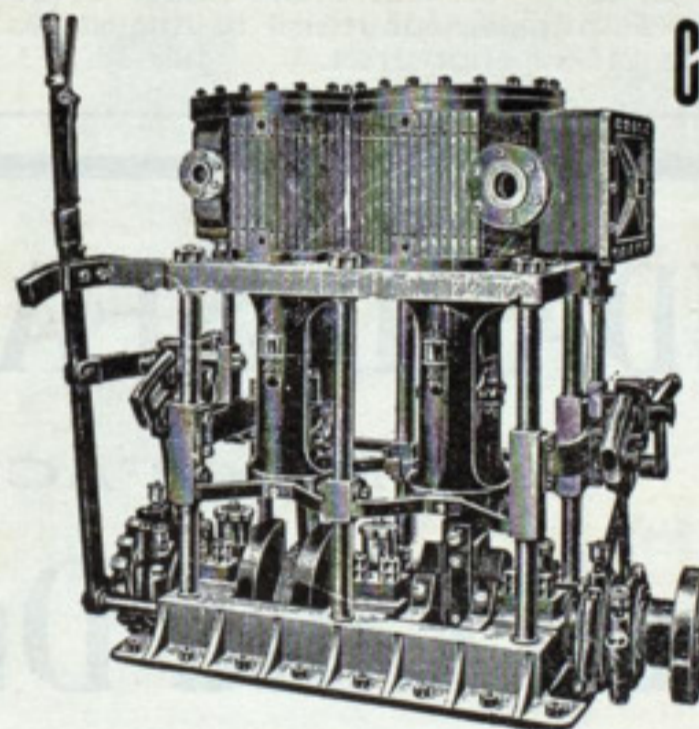
A SPECIALTY.



Marine Boilers.

Centrifugal Pumping Machinery for all Purposes.

Kingsford Foundry and Machine Works,
OSWEGO, N. Y.



Chas. P. Willard & Co.

F. C. WALTER, Manager.

45-49 S. Canal St., CHICAGO.

BUILDERS OF

Marine Engines and Boilers,
Paddle Wheel Engines,
Boat Machinery,
High Pressure, Compound and
Triple Expansion Engines,
Yachts and Launches.

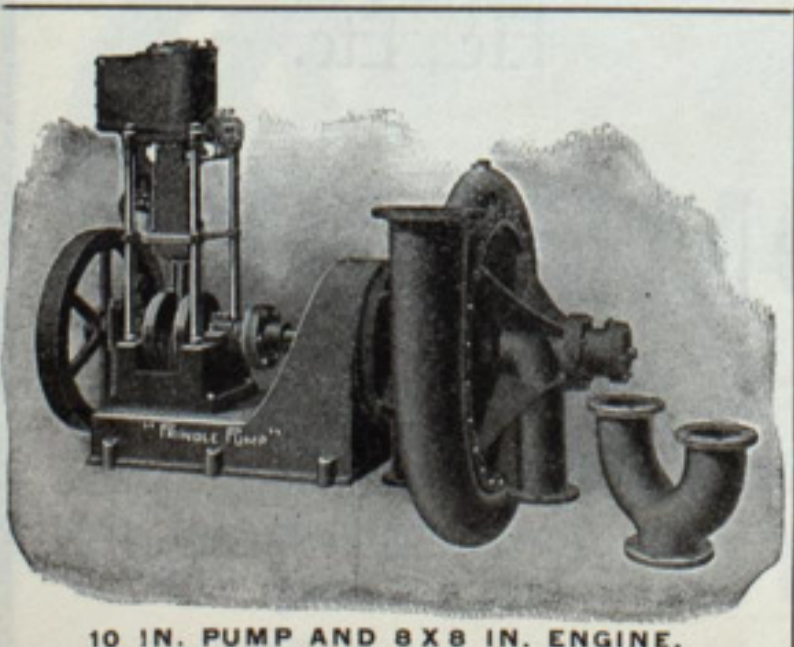
WRITE FOR CATALOGUE.

R. D. WOOD & CO., 400 CHESTNUT ST.,
PHILADELPHIA.

CENTRIFUGAL PUMPS

DIRECT-CONNECTED TO

STEAM ENGINE OR ELECTRIC MOTOR.

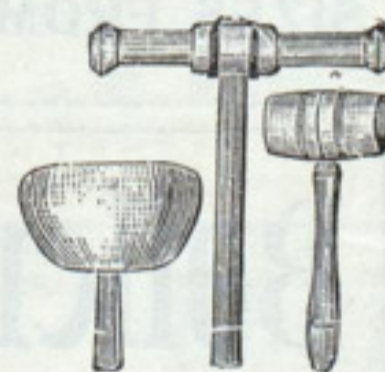


10 IN. PUMP AND 8 X 8 IN. ENGINE.

UNEQUALLED FOR

MARINE SERVICE.

Circulating Water for
Condensers,
Bilge Water Drainage,
Dry Dock Service,
Dredging, Wrecking, &c.



WE ARE THE INVENTORS OF THE CAULKING MALLETS

NOW USED IN ALL THE SHIP YARDS OF THE WORLD.

Specialties: Boiler Makers' Mallets, Stone Cutters' Mallets, Hawsing Beetles, and all kinds of Mallets.

Illustrated Catalogue and Price List upon application.

N. Y. Mallet & Handle Works,
Established 1845.
454 E. Houston Street, NEW YORK, U. S. A.

BARGAINS IN BOOKS.

AS LEADERS IN OUR BOOK TRADE WE WILL
ALLOW FOR A SHORT PERIOD A DISCOUNT OF 25
PER CENT ON THE FOLLOWING BOOKS. LISTED
ON PAGE 35 OF THIS ISSUE OF THE REVIEW:

A Handbook of Engineering Practice—Smart.
Modern Examinations of Steam Engineers—Wakeman.
Elementary Naval Tactics—Bainbridge-Hoff.
Steam Boilers—Peabody & Miller.
Practical Marine Surveying—Phelps.

THE MARINE REVIEW PUB. CO., CLEVELAND, O.

Absolute extinction of fires in holds or bunkers of ships no matter what the cargo.

Machine installed weighs 3800 lbs.

THE CLAYTON FIRE EXTINGUISHING AND DISINFECTING COMPANY,
11 BROADWAY, NEW YORK.



Pan-American Route

between CLEVELAND and BUFFALO.

STEAMERS CITY OF BUFFALO AND CITY OF ERIE.

Finest and fastest passenger steamers in the United States.

TIME CARD—DAILY—APRIL 15 TO DEC. 1.

Leave Cleveland 8 p. m. Arrive Buffalo 6.30 a. m.
Leave Buffalo 8 p. m. Arrive Cleveland 6.30 a. m.

ADDITIONAL SERVICE DURING JULY AND AUGUST.

Connections made at Buffalo with trains for all Eastern and Canadian points;
at Cleveland for Detroit and all points West and Southwest.

SPECIAL LOW RATES CLEVELAND TO BUFFALO AND NIAGARA FALLS
EVERY SATURDAY NIGHT, ALSO BUFFALO TO CLEVELAND.

W. F. HERMAN, General Passenger Agent, Cleveland, O.

GEORGE STRATFORD OAKUM CO.,

MANUFACTURERS OF

Oakum, Plumbers' Spun and Marine Oakum and Spun Cotton.

OFFICE AND FACTORY:

CORNELISON AVENUE, JERSEY CITY, N. J.



ONE OF THESE BINDERS

that will hold 52
NUMBERS
of the

MARINE REVIEW,

Will be mailed to
any address on
receipt of \$1.

MARINE REVIEW...

Perry-Payne Bldg.,
CLEVELAND, O.

Pintsch Gas Lighted Buoys

Adopted by the English, German, French, Russian, Italian, and United States
Light House Departments, for Channel and Harbor Lighting; over 1000 gas
buoys and gas beacons in service.

Burn Continuously

from 80 to 365 days and nights without attention,
and can be seen a distance of six miles.

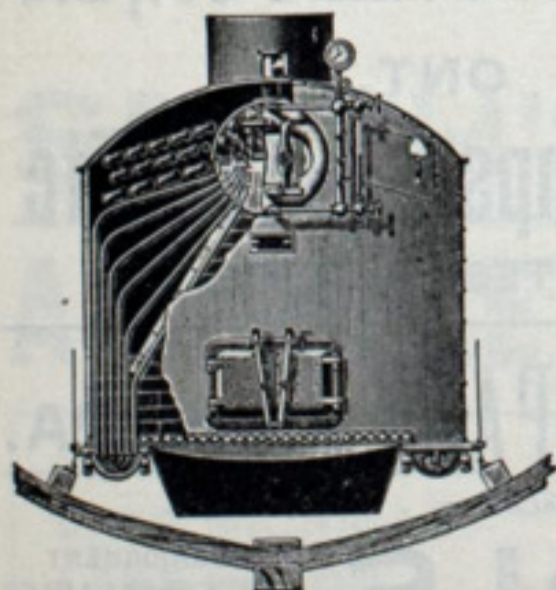
Brilliant and Steady Illumination.

Economical and Reliable in Operation.

Controlled by the **SAFETY CAR HEATING AND LIGHTING CO.,**
160 Broadway, New York City.

SEABURY'S Safety Water Tube Boiler

For all types of Steam Vessels and
Stationary Plants.



Reliable, Safe, Durable, Com-
pact, Light Weight, Econ-
omical, Easily Managed.

Tubes may be readily cleaned, in-
ternally or externally.

Marine Engines,

STEAM and SAIL
YACHTS,
THE ONLY NAPHTHA LAUNCH.

**Gas Engine & Power Co. and
Charles L. Seabury & Co. Consolidated.**

MORRIS HEIGHTS, NEW YORK CITY.

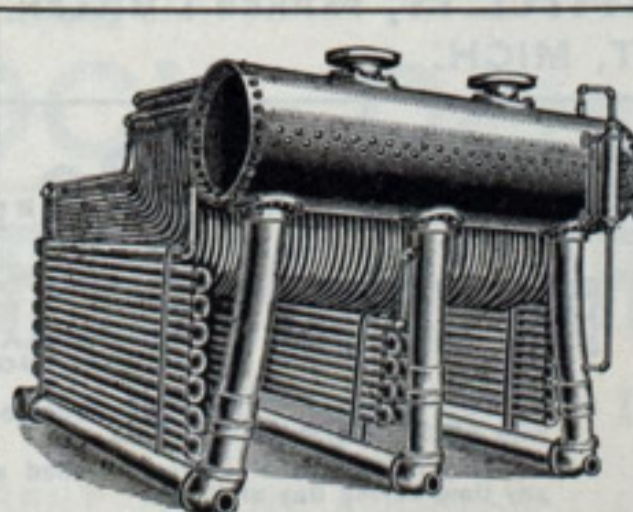
FOGG'S RESILIENT FELT MATTRESSES AND CUSHIONS

MANUFACTURED BY

M. W. FOGG,

20 Fulton St., NEW YORK.

Send for Illustrated Catalogue.



Perspective view of the 250 H. P. boiler built
for steamboat Clara, having 6 feet face and 8
feet length; 37 1/2 square feet of grate area and
1900 square feet heating surface. Weight of
boiler and water, 14,000 lbs.

WE CLAIM for the Boyer Sec-
tional Water Tube Boilers,
that they are of an entirely
new design, are simplest in con-
struction, are accessible to all
parts, are rapid steamers with
short circulation, have low center
of gravity, have no joints in the
fire, have no dead ends, occupy
less space in width, length and
height than any other, are easily
fired, can be repaired or set up by
any ordinary mechanic, do not re-
quire a brick casing, and are
shipped whole or knocked down
into packages for transportation
by man or beast.

The Boyer Water Tube Boiler Co.,

90 Wall Street, NEW YORK.

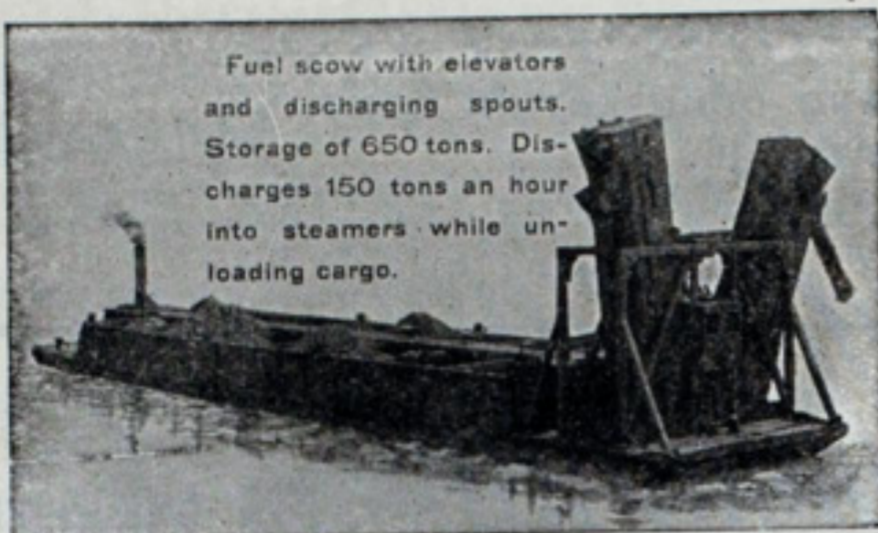
MENTION THIS PAPER.)

OHIO FUEL COMPANY.
WE FURNISH ONLY THE BEST GRADE OF
PITTSBURGH and GOSHEN STEAM COAL.
LIGHTER OF 300 TONS CAPACITY.
Dock Phone, Bell West 841. 219 The Cuyahoga Building,
Office Phones: { Bell Main 526. CLEVELAND, O.
 { Cuyahoga C 240.

Steamboat Fuel at Ashtabula. LARGE SUPPLIES OF
BEST QUALITY

Lighter

Carrying
Different
Grades
at all
Times.



M. A. HANNA & CO., Miners and Shippers.
Main Office, Perry-Payne Bldg., Cleveland

THE Swain Wrecking Co.
L. C. WALDO, Pres.

The TUG FAVORITE
STATIONED AT CHEBOYGAN, MICH.
WITH COMPLETE WRECKING OUTFIT
IN CHARGE OF
Capt. Martin Swain.
CANADIAN WRECKER SAGINAW
STATIONED AT DETROIT, MICH.
ABLES US TO WRECK IN CANADIAN
WATERS
STEAM PUMPS AND SUB-MARINE
WORK IN CHARGE OF
JOHN B. QUINN.
Address all communications to
PARKER MILLER
OFFICE IS AT WATER ST. WEST
DETROIT, MICH.

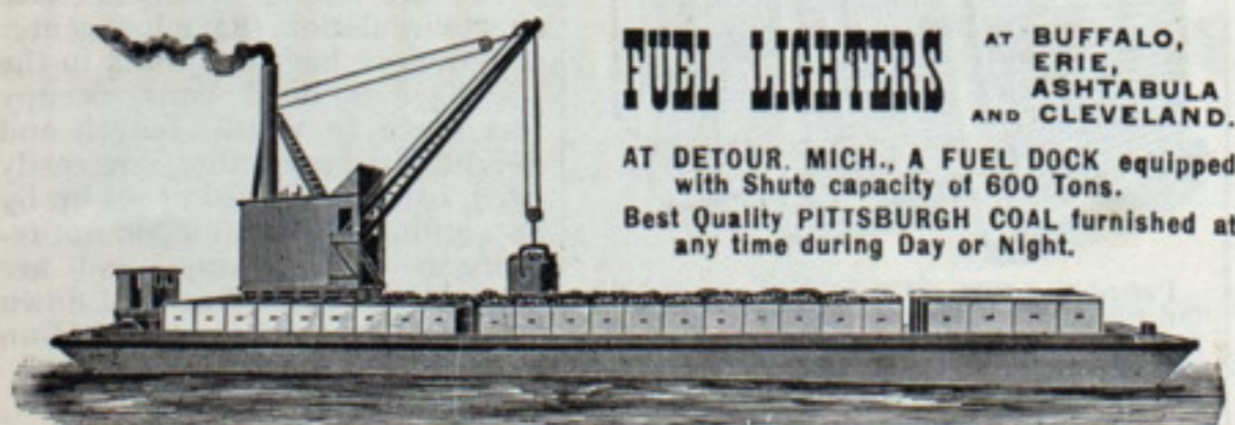
4 STEAM PUMPS, 10 JACKS, 3 HAWKERS.
1 COAL and ORE PUMP
3-12 INCH ROTARY,
1-14 INCH WORTHINGTON
DIVING RIGS
AND
DIVERS
ABOARD
ALL TIMES

JULY.						
S	M	T	W	T	F	S
...	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	...	...	...

10-100 TON JACKS
1-12 INCH HAWSER
1-9
Capt. MARTIN SWAIN,
CHEBOYGAN, MICH.
TELEGRAPH

A. A. & B. W. PARKER, SUCCESSORS TO
PARKER & MILLER,
DETROIT, MICH.

Pickands, Mather & Co.,



Western Reserve Building, CLEVELAND, O.

To Admiralty Lawyers.

TO ALL LAWYERS, IN FACT, AND ALL OWNERS OF REFERENCE LIBRARIES.

We are offering a nautical encyclopedia, carefully revised, and up to date in all respects. Deals with 5,000 subjects and contains 500 descriptive engravings. Explains every term in the great mass of sea literature. It should interest every member of the naval, revenue, coast survey, transport and light-house services, for it is an invaluable reference work for them. It goes thoroughly into every feature of these services. It should interest also members of the merchant marine, yachtsmen, builders of steam and sailing vessels and underwriters.

Edited by **HOWARD PATTERSON,**
Author of several similar works.

JUST FROM THE PRESS.

Price only \$3.

THE MARINE REVIEW PUB. CO.,
CLEVELAND, O.

MODERN SEAMANSHIP.

By **AUSTIN M. KNIGHT,** Lieutenant-Commander, United States Navy.

CONTENTS.

- Chapter I. The Hull and Fittings of a Ship.
- Chapter II. Rope—Knotting and Splicing.
- Chapter III. Spars and Standing Rigging.
- Chapter IV. Sails and Running Gear.
- Chapter V. Mechanical Appliances on Shipboard.
- Chapter VI. Blocks and Tackles.
- Chapter VII. Handling Heavy Weights.
- Chapter VIII. The Compass, Log, and Lead.
- Chapter IX. Boats.
- Chapter X. Handling Boats in a Surf.
- Chapter XI. Ground Tackle.
- Chapter XII. Carrying Out Anchors.
- Chapter XIII. The Steering of Steamers.
- Chapter XIV. The Rules of the Road.
- Chapter XV. Maneuvering to Avoid Collision.
- Chapter XVI. Piloting.
- Chapter XVII. Handling a Steamer Alongside a Dock.
- Chapter XVIII. Placing a Ship in Dry Dock.
- Chapter XIX. Weather, and the Laws of Storms.
- Chapter XX. Handling Steamers in Heavy Weather.
- Chapter XXI. Towing.
- Chapter XXII. Rescuing the Crew of a Wreck.
- Chapter XXIII. Man Overboard.
- Chapter XXIV. Stranding.
- Chapter XXV. Making and Taking in Sail.
- Chapter XXVI. Maneuvering Under Sail.
- Chapter XXVII. Getting Underway and Coming to Anchor Under Sail.

PRICE \$6.

THE MARINE REVIEW PUB. CO., CLEVELAND, O.

The Erie & Western Transportation Co. ANCHOR LINE. 1901.

Passenger Service—

Steamers.....India, China, Japan.
Ports of call... Buffalo, Sault Ste. Marie, Hancock, Marquette, Cleveland,
Detroit, Mackinac Island, Port Huron, Duluth, Houghton,
Erie,

Freight Service—

Steamers.....Alaska, Delaware, Codorus, Mahoning, Susquehanna,
Schuylkill, Lycoming, Conestoga, Clarion, Wissahickon,
Conemaugh, Juniata, Lehigh,

Ports of call... Buffalo, Erie, Cleveland, Marquette,
Detroit, Houghton, W. Superior, Hancock, Duluth,
Sault Ste. Marie, Chicago, Milwaukee.

CHAS. E. MARKHAN, Gen. Pass. Agt., E. T. EVANS, Western Manager,
Buffalo, N. Y. Buffalo, N. Y.

THE DONNELLY SALVAGE AND WRECKING CO., Ltd

JOHN DONNELLY, Sr., Pres.
JOHN DONNELLY, Jr., Vice-Pres.
H. B. FOLGER, Treas.
THOS. DONNELLY, Secy.

KINGSTON ONT.

Divers, Steam Pumps, Tugs, Etc
SUPPLIED ON SHORTEST NOTICE.

The W. L. SCOTT COMPANY, ERIE, PA.

WHOLESALE DEALER IN

SHAMOKIN ANTHRACITE COALS YOUGHIOGHENY
WILKESBARRE MANSFIELD

VESSEL FUELING A SPECIALTY By STEAM LIGHTER or Car Dump
at all hours. Electric Light.

Main Office, Scott Block, Long Distance Telephone No. 440.
Fueling Office, Canal Dock, Long Distance Telephone No. 320.

CASTNER, CURRAN & BULLITT,

SOLE AGENTS FOR

POCAHONTAS SMOKELESS SEMI-BITUMINOUS COAL

THE BEST STEAM COAL IN THE WORLD.

Officially endorsed by Great Britain and United States. Standard Fuel of United States Navy.

Used exclusively on Cunard, White Star and other Transatlantic Lines.

Main Office, 328 Chestnut Street - - PHILADELPHIA PA.

BRANCH OFFICES:

1 Broadway, New York.

Citizens Bank Building, Norfolk, Va.

Calle Reconquista 399, Buenos Ayres, Argentine Republic, South America.

Old Colony Building, Chicago, Ills.

70 Kilby Street, Boston, Mass.

Terry Building, Roanoke, Virginia.

Neave Building, Cincinnati, Ohio.

4 Fenchurch Avenue, London, England.

PITTSBURG COAL CO.

Steamboat Fueling Facilities at various points on the Great Lakes:

Cleveland Harbor { 4 Car Dumpers. 3 Lighters.	Fairport Harbor { 1 Car Dumper. 1 Lighter.	Ashtabula Harbor { 1 Car Dumper. 1 Lighter.	Erie Harbor { 1 Car Dumper. Fuel Pockets.
Detroit River Branch { Docks and Pockets at Sandwich and Amherstburg.		Sault River Branches { Dock and Pockets at Detour. Dock and Pockets at Sault Ste. Marie. (The Port Royal Dock Co.)	

WE FURNISH ONLY THE BEST GRADE OF **PITTSBURG and YOUGHIOGHENY COAL.**

General Office, Lake Department, Perry-Payne Building, Cleveland, O.

STEAMBOAT FUEL AT CHICAGO.



**Youghioghenny and
Lehigh Coal Co.**

J. T. CONNERY, Manager. ARCHIE J. HITCHCOCK, Dock Sup't.

FUEL DOCKS: No. 1, Michigan Slip & Basin. 'Phone Main 1650.
No. 2, N. Halsted St. Bridge. 'Phone Main 1649.
No. 3, Foot South Water St. and Illinois Central
Slip C. 'Phone Main 1679.

FUEL LIGHTER: Equipped with 125 2-ton Buckets for Fuel-
ing Anywhere in Harbor.

MAIN OFFICE: 1238-1242 Chicago Stock Exchange Building.
Long Distance Telephone, Main 1650. 110 LA SALLE STREET.

The Rochester & Pittsburgh Coal & Iron Co.

REYNOLDSVILLE COAL.

STEAMBOAT FUEL DOCK—Blackwell Canal at Michigan St.
Bridge. 1400 feet of dock frontage. Hulett Car Dump-
ing Machine. Steam Fuel Scow of 550 tons capacity.
Boats coaled day or night.

OFFICE: 684-88 Ellicott Square, BUFFALO, N. Y.
TELEPHONE, Seneca 1154.

E. McQ. DUTHIE,
Cargo and Fuel Agent.



STANLEY B. SMITH & CO.

DETROIT, MICH.

SHIPPERS
OF

COAL

BY
RAIL AND LAKE

OPERATING

SMITH'S COAL DOCK, Detroit River.

A COMPLETE SET OF CHARTS OF THE GREAT LAKES

LAKE SUPERIOR.	DETROIT RIVER.
LAKE MICHIGAN.	ST. CLAIR RIVER.
LAKE HURON.	LAKE ST. CLAIR.
LAKE ERIE.	STRAITS OF MACKINAC.
ST. MARY'S RIVER IN THREE PARTS.	

ELEVEN IN ALL

SENT TO ANY ADDRESS, CARRIAGE PREPAID, FOR

== \$5.45. ==

THE MARINE REVIEW PUB. CO., 418-419 Perry-Payne Building, CLEVELAND, O.

VESSEL AND INSURANCE AGENTS.

C. W. ELPHICKE & CO.

Vessel and Insurance Agents,

C. W. ELPHICKE, Room 10, No. 6 Sherman St.,
 CALVIN CARR, CHICAGO, ILL.
 H. B. EARHART, Long Distance Telephone, Harrison 1194.
 R. J. DUNHAM.

MITCHELL & CO.

JOHN MITCHELL.
 JOHN F. WEDOW.
 ALFRED MITCHELL.

Vessel and Insurance Agents,

Office Telephone M 767. 508, 509 & 510 Perry-Payne Bldg.,
 Residence, John Mitchell, Doan 341. CLEVELAND, O.
 John F. Wedow, Doan 141 J. Alfred Mitchell, Doan 218.

F. H. OSBORN & CO.

Marine Insurance Brokers,

12 Sherman Street,

Long Distance Telephone, CHICAGO.
 Harrison 1586.

D. T. HELM & CO.

Vessel Agents,

TRANSPORTATION. Board of Trade,
 MARINE INSURANCE. DULUTH, MINN.

W. C. RICHARDSON,

Vessel and Marine Insurance Agent,

420-421 Perry-Payne Building,

Office Telephone 338. CLEVELAND, O.
 Residence Telephone 2938.

D. SULLIVAN & CO.

D. SULLIVAN.
 F. J. SULLIVAN

VESSEL AGENTS.

MARINE INSURANCE.

2 & 4 Sherman Street, CHICAGO, ILL.
 Tel. Harrison 2847.

J. G. KEITH & CO.

Vessel and Insurance Agents,

138-139 Rialto Building,

Long Distance Telephone, Harrison, 1339. CHICAGO.

S. R. CHAMBERLAIN & CO.

Vessel and Insurance Agents,

No. 6 Sherman Street, CHICAGO.

HALL & ROOT,

JOHN B. HALL.
 HARRY B. ROOT.

Vessel Agents,

21-22 Exchange Building, 202 Main St.,

Telephone Seneca 892. BUFFALO, N. Y.

DRAKE & MAYTHAM,

Vessel Agents,

M. M. DRAKE. 202 Main Street,
 G. W. MAYTHAM.
 Telephone Seneca 1660. BUFFALO, N. Y.

HUTCHINSON & CO.

Vessel and Insurance Agents,

Office Telephone, Main 2453.
 Residence C. L. Hutchinson, W. 697L.
 Residence W. H. McGean, E. 198J.

313-315 Perry-Payne Bldg.,
 CLEVELAND, O.

JOHN J. BOLAND,

Vessel and Insurance Agent,

25-26 Exchange Bldg., 202 Main St.,

Telephone Seneca 115. BUFFALO, N. Y.

Nautical Encyclopedia

BY HOWARD PATTERSON.

Most complete work of its kind ever issued.
 In press. Price \$3.00. Published by the Marine
 Review Pub. Co., Cleveland, O.

VESSEL AND INSURANCE AGENTS.

SAMUEL HOLMES,

Steamship Offices,

For Selling, Chartering and Building
 all classes Steam Vessels. 66-68 Broad St.,
 Steam Vessel Circulars. NEW YORK.
 Weekly Freight Circulars.

WILSON TRANSIT CO.

General Forwarders,

Perry-Payne Bldg. CLEVELAND, O.

BROWN & CO.

J. J. H. BROWN.
 J. B. RODGERS.
 EDWARD SMITH.

Vessel and Insurance Agents,

202 Main Street,

BUFFALO, N. Y.

PROCTORS IN ADMIRALTY.

RAY G. MACDONALD,

Attorney at Law and Proctor in Admiralty,

Suite 618 New York Life Building,

Telephone Central 723. CHICAGO, ILL.

STOWE & GRAYDON,

Lawyers and Proctors in Admiralty,

WILLIAM E. STOWE. 204 Dearborn Street,
 THOMAS J. GRAYDON.
 Suite 806 Marquette Building. CHICAGO
 Telephone Central 1225.

HOYT, DUSTIN & KELLEY,

Lawyers and Proctors in Admiralty,

Offices, 702 Western Reserve Building,

CLEVELAND, O.

White, Johnson, McCaslin & Cannon,

ATTORNEYS AT LAW and
 PROCTORS IN ADMIRALTY,

Williamson Building, CLEVELAND, O.

GOULDER, HOLDING & MASTEN,

LAW OFFICES,

HARVEY D. GOULDER. Perry-Payne Building,
 S. H. HOLDING.
 FRANK S. MASTEN. CLEVELAND, O.

ALBERT J. GILCHRIST,

PROCTOR IN ADMIRALTY,

604 Perry-Payne Building,

CLEVELAND, O.

ORESTES C. PINNEY,

Lawyer and Proctor in Admiralty,

Rooms 316 and 317 Perry-Payne Building,

Telephone Main 2585. CLEVELAND, O.

"Elements of Navigation" (Henderson)

Just the book for beginners—
 mates, wheelmen and watchmen.
 Recommended because it is
 short, simple and yet compre-
 hensive.

Price \$1.

THE MARINE REVIEW PUB. CO., CLEVELAND.

PROFESSIONAL.

W. J. WOOD, Naval Architect,
Ship Surveyor.
Consulting Engineer.

Prepares designs or working drawings and specifica-
 tions for all classes of vessels and superintends con-
 struction and repairs. Surveys damaged property and
 estimates cost of repairs.

Vessels designed—Twin S. S. Virginia, Steam Yacht
 Comanche, Twin S. S. North West and North Land,
 I. W. Nicholas, and many others, including Fire
 Boats, Tugs, Barges, etc.

COMPLETE PLANS FURNISHED FOR
 STEEL COMPOSITE OR WOODEN VESSELS

Office on Goodrich Dock,
 foot of Michigan Avenue, CHICAGO, ILL.

Pittsburgh Testing Laboratory, Ltd.,

INSPECTING AND METALLURGICAL
 ENGINEERS AND CHEMISTS,

1750 Monadnock, 325 Water Street,
 CHICAGO. PITTSBURGH.

906-7 Crozier Building, Philadelphia.

New York City, 60 New Street.

Richmond, Va., 1107½ Main Street.

Inspectors of Shipbuilding Materials and Machinery.
 Inspectors located at all mills, Physical and Chemical
 Laboratories. Tests of all kinds.

ROBERT W. HUNT & CO.

Bureau of Inspection, Tests and Consultation.

1121 The Rookery, Chicago.

Monong. Bank Bldg., Pittsburgh.

71 Broadway, New York.

Inspectors of Shipbuilding Material and Machinery. In-
 spectors of all Materials. Duty Tests of Engines
 and Boilers. Physical and Chemical Laboratories.

HORACE SEE,

CONSULTING ENGINEER

AND NAVAL ARCHITECT,

No. 1 Broadway, NEW YORK

EDWARD GASKIN,

Ship Building Expert.

Plans and specifications for ships, surveys and
 estimates, superintendence, etc.

ELLICOTT SQUARE, BUFFALO, N. Y.

AMBROSE V. POWELL, M. Am. Soc. G. E.

CIVIL ENGINEER,

Designs and Constructs Dry Docks,
 Harbor Works, Docks and Plant for
 Handling Coal and Ore, Foundations.

Office, 1008 Chamber of Commerce, CHICAGO, ILL.

PATENTS.

THURSTON & BATES,

Counselors at Law in Patent Causes
 and Solicitors of Patents,

1028 Society for Savings Bldg.,

E. L. THURSTON. CLEVELAND, O.
 ALBERT H. BATES.

HERBERT WRIGHT & CO.,

1011-1015

THE WILLIAMSON BUILDING,

CLEVELAND, O.

TELEPHONE, MAIN 2754.

Every possible facility for conducting a
 brokerage business in

STOCKS, BONDS, GRAIN, ETC.**Compass Adjuster**

CAPT. J. M. FIELDS.

Inventor of Fields' Course Finder,

BETHEL HOTEL

CLEVELAND O.

Books on Naval Architecture, SHIP YARD PRACTICE, SEAMANSHIP, Etc.

AMERICAN PRACTICAL NAVIGATOR—Nathaniel Bowditch. \$2.25.
 AZIMUTH TABLES for the Great Lakes—Hydrographic Office. 50 cents.
 BOILER MAKERS AND IRON SHIP BUILDERS' COMPANION. Comprising a series of original and carefully calculated tables. James Foden. \$2.
 BOWDITCH'S USEFUL TABLES. \$1.25.
 DATA BOOK—Naval architects and engineer's data book. By T. H. Watson. A reliable and simple means of recording valuable data, etc., of vessels and engines. Size of book, 8 $\frac{3}{4}$ in. by 5 in., cloth, \$2.
 ELEMENTARY NAVAL TACTICS—Com. Wm. Bainbridge-Hoff, U. S. N. \$2.
 ELEMENTARY SEAMANSHIP—D. Wilson Barker. \$2.
 ELEMENTS OF NAVIGATION—Henderson. \$1.
 GEORGIAN BAY AND NORTH CHANNEL PILOT—Department of Marine and Fisheries, Canada.
 GEORGIAN BAY AND NORTH CHANNEL SAILING DIRECTIONS—Hydrographic Office. 40 cents.
 HINTS ON LEGAL DUTIES OF SHIPMASTERS—B. W. Ginsburg. \$1.75.
 ILLUSTRATED NAUTICAL ENCYCLOPEDIA—Howard Patterson. In press. \$3.
 ILLUSTRATIVE CLOUD FORMS FOR THE GUIDANCE OF OBSERVERS IN THE CLASSIFICATION OF CLOUDS—Hydrographic Office. \$1.00.
 INTERNATIONAL SIGNAL CODE—Bureau of Navigation. \$2.50.
 KNOW YOUR OWN SHIP—Thos. Walton. \$2.50.
 LAKE SUPERIOR AND ST. MARY'S RIVER SAILING DIRECTIONS—Hydrographic Office. 30 cents.
 LATITUDE AND LONGITUDE: How to Find Them—W. J. Millar. \$1.
 MANUAL OF ALGEBRA—R. C. Buck. For the use, more especially, of young sailors and officers in the merchant navy; numerous examples and exercises. \$1.50.
 MARINER'S COMPASS IN AN IRON SHIP: How to keep it efficient and use it intelligently. J. W. Dixon. \$1.
 MODEL ENGINES AND SMALL BOATS—N. M. Hopkins. New methods of engine and boiler making; ship design and construction; fifty illustrations. \$1.25.
 MODERN SEAMANSHIP—Lieut. Com. Austin M. Knight, U. S. N. Adopted as the text book of the United States Naval Academy. \$6.

MODERN PRACTICE OF SHIP BUILDING IN IRON AND STEEL. Samuel J. P. Thearle. 2 volumes. Second edition, revised and enlarged. \$5.25.
 NAVAL ARCHITECTURE: A treatise on laying off and building wood, iron and composite ships. Samuel J. P. Thearle. In two volumes. \$3.
 NAVAL ARCHITECTURE: A manual on laying off iron and steel vessels—Thos. H. Watson. Valuable for naval architects as well as beginners in ship yards. \$5.
 NAVAL ARCHITECTURE—Sir W. H. White. New Edition. 750 pages. \$9.
 NAVAL ARCHITECTURE—J. J. Welch. New edition. Out soon.
 NAVAL ARCHITECTS AND SHIPBUILDER'S POCKET BOOK—Clement Mackrow. Formulae, rules and tables, and marine engineers' and surveyors' Handy Book of Reference. Seventh edition. 700 pages; pocket-book form. \$5.
 NAVAL POCKETBOOK—Clowe. \$2. Containing valuable information concerning all navies of the world.
 NAVIGATION AND NAUTICAL ASTRONOMY—Prof. J. H. C. Coffin. \$3.50.
 NAVIGATION: THEORETICAL AND PRACTICAL—D. Wilson Barker. Illustrated. \$1.50.
 OCEAN METEOROLOGY: For vessels of the Merchant Navy—William Allingham. \$2.
 THE PILOT: A guide, to United States Local Inspectors' examinations of Masters and Mates. R. M. Pugsley. \$1.
 POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. \$3.
 PRACTICAL INFORMATION ON THE DEVIATION OF THE COMPASS, for the use of Masters and Mates of Iron Ships—J. T. Towson. \$2.
 PRACTICAL MARINE SURVEYING—Harry Phelps. \$2.50.
 PRACTICAL MECHANICS, Applied to the Requirements of the Sailor—Thos. Mackenzie. \$1.50.
 PRACTICAL NAVAL ARCHITECTURE—S. J. P. Thearle. Two vols., \$3.
 PRACTICAL SEAMANSHIP FOR USE IN THE MERCHANT SERVICE: Including all ordinary subjects; also Steam Seamanship, Wreck Lifting, Avoiding Collision, Wire Splicing, Displacement, and everything necessary to be known by seamen of the present day. Second edition, illustrated. John Todd and W. B. Whall. \$8.40.

PROJECTION TABLES—Bureau of Navigation. \$1.50.
 RESISTANCE AND PROPULSION OF SHIPS—Durand. \$5.
 RESISTANCE AND PROPULSION OF SHIPS—By Taylor. \$3.75.
 SAILING DIRECTIONS FOR THE GREAT LAKES AND CONNECTING WATERS. Second edition. Hydrographic Office. 30 cents.
 SCOTT'S COAST PILOT FOR THE GREAT LAKES. \$1.50.
 SCREW PROPELLERS AND MARINE PROPULSION—I. McKim Chase. \$2.50.
 SELF-INSTRUCTION IN THE PRACTICE AND THEORY OF NAVIGATION—Earl of Dunraven. Two volumes. \$7.
 SHIP BUILDING—Tables for constructing ship's lines. Second edition. Archibald Hogg. \$2.
 SIMPLE ELEMENTS OF NAVIGATION—Young. New second edition, \$2; a few copies of the first edition at \$1.
 STABILITY OF SHIPS—Sir E. J. Reed. \$3.40.
 STEAM YACHTS AND LAUNCHES—By Kuhnhardt. \$3.
 STEERING OF SHIPS AND YACHTS AND MANEUVERING THEM IN NARROW WATERS; having especial reference to the influence of the Screw Propeller on the steering of steamers. Sir C. Purcell Taylor. \$1.25.
 ST. LAWRENCE RIVER SAILING DIRECTIONS. Second edition. Hydrographic Office. 70 cents.
 SUBMARINE BOATS—By Hovgaard. \$2.
 TABLES FOR FINDING THE DISTANCE OF AN OBJECT BY TWO BEARINGS—Hydrographic Office, U. S. N. 30 cents.
 TEXT BOOK OF SEAMANSHIP—Com. S. B. Luce, U. S. N. Equipping and handling of vessels under sail or steam. \$10.
 THEORETICAL NAVAL ARCHITECTURE: A treatise on the calculations involved in naval design. Samuel J. P. Thearle. In two volumes. \$3.50.
 THEORETICAL NAVAL ARCHITECTURE—E. L. Attwood. Text book; 114 diagrams. \$2.50.
 TRIGONOMETRY FOR THE YOUNG SAILOR—R. C. Buck. \$1.50.
 "WRINKLES" IN PRACTICAL NAVIGATION. Ninth edition, revised. S. T. S. Lecky. \$8.40.

Books on Marine Engineering, On the Operation of Engines and for Beginners in the Engine Room.

AIDS TO ENGINEERS' EXAMINATIONS, with Questions and Answers—N. Hawkins. \$2.
 ALGEBRA SELF-TAUGHT—W. P. Higgs. Fourth edition. 60 cents.
 AMERICAN MARINE ENGINEER—By Edwards. \$2.50.
 ARITHMETIC OF THE STEAM ENGINE—E. S. Gould. \$1.
 BOILER MAKERS AND IRON SHIPBUILDERS' COMPANION—James Foden. \$2.
 BREAKDOWNS AT SEA AND HOW TO REPAIR THEM—A. R. Leask. 252 pages. \$2.
 BREAKDOWNS—Thos. Reed. \$1.50.
 CATECHISM OF THE MARINE STEAM ENGINE—Edwards. \$2.
 DATA BOOK—Valve setting record book, for the use of marine engineers, by P. A. Low. 60 cents.
 DATA BOOK—The engineer's and draughtsman's data book, for workshop and office use. So arranged that the data of a complete set of engines, boilers, auxiliary engines, pumps, etc., for a steamship can be recorded on four pages. Enough space for 20 sets of engines. Bound in full limp leather. \$1.25.
 DATA BOOK—Marine engineer's record book—engines. By Bryan C. Bartley. Names of all parts, etc., are printed in one column on the left hand side of book when opened, and the remaining space is lined and column ruled for the recording of all necessary data. Complete thumb index which will facilitate ready reference. Contains enough space for 22 complete sets of engines. Size of book, 7 $\frac{3}{4}$ x 5 $\frac{1}{4}$ in., bound in full limp leather. \$2.00.
 DRAWING AND DESIGNING FOR MARINE ENGINEERS—Chas. W. Roberts. \$3.
 ELECTRIC LIGHTING FOR MARINE ENGINEERS, or how to light a ship by the electric light and how to keep the apparatus in order. S. F. Walker. \$2.
 ELECTRIC SHIP LIGHTING—A hand book on the practical fitting and running of ship's electrical plant. J. W. Urquhart. \$3.
 ELEMENTARY LESSONS IN STEAM MACHINERY—Langmaid and Galsford. For students and subordinates in marine engineering. \$2.
 ENGINEER'S MANUAL—By Ainsley. \$5.
 ENGINEERS' SKETCH BOOK—T. W. Barber, M. E. \$4.
 ENGINE ROOM PRACTICE—John Leveridge. \$2.50.
 ENGINES AND ENGINE RUNNING—Joshua Rose. For the use of those who desire to pass an examination to take charge of an engine or boiler; illustrated. \$2.50.
 EXAMINATION QUESTIONS AND ANSWERS—Emory Edwards. 900 examination questions and answers for young engineers and firemen who desire to obtain marine licenses. \$1.50.
 GAS AND OIL ENGINES—G. Richmond. A practical hand book on the care and management of gas engines, with instructions for running oil engines. \$1.
 HAND BOOK OF ENGINEERING PRACTICE—Richard A. Smart. \$1.25.
 HAWKINS' INDICATOR CATECHISM. \$1.
 HIGH SPEED STEAM ENGINES—W. Norris and Ben H. Morgan—With 115 illustrations. \$2.50.

HOW TO RUN ENGINES AND BOILERS. Practical instruction for young engineers and steam users. E. P. Watson. New fifth edition. \$1.
 KEY TO ENGINEERING, WHAT AN ENGINEER SHOULD KNOW ABOUT ELECTRICITY AND ENGINEER'S EPITOME—Three excellent little books for marine engineers. 50 cents each, or three for \$1.
 KEY TO ENGINES AND ENGINE RUNNING—Joshua Rose. For use of those desiring to pass examination to take charge of an engine or boiler. \$2.50.
 LESSONS AND PRACTICAL NOTES ON STEAM, THE STEAM ENGINE, PROPELLERS, ETC.—King. \$2.
 LIBRARY OF STEAM ENGINEERING—John Fehrenbach, M. E. \$5.
 LUBRICANTS, OILS AND GREASES. Redwood. \$1.50.
 MACHINISTS' AND DRAFTSMEN'S HAND BOOK—Feder Lobben. A reference book for all interested in mechanical work. \$2.50.
 MARINE BOILER MANAGEMENT AND CONSTRUCTION—C. E. Stromeyer. \$5.
 MARINE BOILERS: A treatise on the Causes and Prevention of their Priming, with remarks on their general management. Reed. \$2.
 MARINE BOILERS—L. E. Bertin. 250 illustrations, designs and tables. \$7.50.
 MARINE ENGINEERS—Constantine. Just out. \$2.50.
 MARINE ENGINES—R. Murray. \$1.80.
 MARINE PROPELLERS—By Barnaby. \$4.25.
 MARINE STEAM ENGINES—Sennett & Oram. \$6.
 MARINE STEAM ENGINES—Main and Brown. \$5.
 MECHANICS' AND ENGINEERS' POCKET BOOK, including Naval Architecture, Steam and the Steam Engine, Steam Vessels, etc. 64th edition, 1050 pages. Chas. H. Haswell. \$4.
 MECHANICAL ENGINEERS' POCKET BOOK—Wm. Kent. Reference book of rules, tables, etc. \$5.
 MECHANISM OF MEN-OF-WAR—R. C. Oldknow. A description of machinery to be found in modern fighting ships. Numerous illustrations. \$3.
 MODERN EXAMINATIONS OF STEAM ENGINEERS—W. H. Wakeman. \$1.50.
 MODERN AMERICAN MARINE ENGINES—By Edwards. \$5.
 MODERN MARINE ENGINEERING—By Burgh. \$10.
 NAUTICAL ENCYCLOPEDIA, ILLUSTRATED—Howard Patterson. Complete from Standpoint of Marine Engineer and Naval Architect. In press. \$3.
 NAVAL ENGINEER AND THE COMMAND OF THE SEA—F. G. Burton. \$1.25.
 NEW CATECHISM OF ELECTRICITY—N. Hawkins. \$2.
 POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. \$3.
 POCKET-BOOK FOR BOILERMAKERS AND STEAM USERS—M. J. Sexton. \$2.

PRACTICAL ADVICE FOR MARINE ENGINEERS—C. W. Roberts. 64 illustrations. \$1.
 PROGRESS OF MARINE ENGINEERING—By Main. \$1.50.
 QUESTIONS AND ANSWERS, 188 Elementary, from Reed's Engineers' Hand Book. A valuable help to the young engineer working up for his license. \$1.
 QUESTIONS AND ANSWERS, sixth edition—Stephen Roper. \$2.
 REED'S ENGINEERS' HAND BOOK—New edition; illustrated by 345 diagrams and 36 large plates. \$5.
 REED'S KEY to Reed's Hand Book—Contains working of all questions given in examination papers. \$3.
 RESISTANCE AND PROPULSION OF SHIPS—W. F. Durand, principal of school of marine construction, Cornell University. \$5.
 REED'S GUIDE to the extra first-class engineers' examination. \$5.
 ROPER'S ENGINEERS' HANDY BOOK for Steam Engineers and Electricians. Revised and enlarged. \$3.50.
 SCREW PROPULSION—By Taylor. \$3.75.
 SLIDE VALVE, SIMPLY EXPLAINED—W. J. Tennant. \$1.
 SLIDE VALVES—C. W. MacCord, Jr. A book for practical men on the principles and methods of design. \$1.50.
 SMALL ENGINES AND BOILERS—Egbert P. Watson. A manual of concise and specific directions for construction of small steam engines and boilers of modern types; illustrated. \$1.25.
 STEAM AND THE MARINE STEAM ENGINE—Jno. Yeo. \$2.50.
 STEAM BOILERS: Their management and working on land and sea. James Peattie. \$2.
 STEAM BOILERS—Joshua Rose. Practical treatise on construction and examination. Seventy-three engravings. \$2.50.
 STEAM BOILERS—Peabody & Miller. \$2.50.
 STEAM ENGINES AND BOILERS—Frederick Colyer. \$5.
 STEAMSHIPS AND THEIR MACHINERY—By Hal-dane. \$6.
 TEXT BOOK ON MARINE ENGINEERING—Tompkins. \$3.00.
 THEORETICAL AND PRACTICAL AMMONIA REFRIGERATION—I. I. Redwood. \$1.
 THEORY OF STEAM ENGINE—Weisbach. \$5.
 TRIPLE AND QUADRUPLE EXPANSION ENGINES AND BOILERS AND THEIR MANAGEMENT—A. Ritchie Leask. Third edition, revised. \$2.
 USEFUL HINTS TO SEAGOING ENGINEERS, AND HOW TO REPAIR AND AVOID BREAKDOWNS. Second edition, revised and enlarged. Reed. \$1.40.
 WATER TUBE BOILERS—Fifth revised and enlarged edition of HOW TO RUN ENGINES AND BOILERS—E. P. Watson. Practical instruction for young engineers and steam users. \$1.

The Marine Review Publishing Co.,

Sent to any address, carriage prepaid, at prices named.

PERRY-PAYNE BUILDING, CLEVELAND.

BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review Pub. Co., 418-419 Perry-Payne Bldg., Cleveland.
See accompanying Index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.

"Long Arm" System Co.....Cleveland.

AIR PUMPS AND APPLIANCES.

Gleason-Peters Air Pump Co.....New York.
Fore River Ship & Engine Co.....Quincy, Mass.

ANCHORS.

Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.
Seaboard Steel Casting Co.....Chester, Pa.

ANTI-FRICTION METALS.

Cramp, Wm. & Sons.....Philadelphia.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

ARTIFICIAL DRAFT FOR BOILERS.

American Blower Co.....Detroit.
American Ship Building Co.....Cleveland.
Bloomsburg & Co., H.....Newport News, Va.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Detroit Shipbuilding Co.....Detroit.
Sturtevant, B. F. Co.....Boston.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
MacDonald, Ray G.....Chicago.
Pinney, Orestes C.....Cleveland.
Stowe & Graydon.....Chicago.
White, Johnson, McCaslin & Cannon.....Cleveland.

BAROMETERS, MARINE GLASSES, ETC.

Bliss, John & Co.....New York.
Goetz, C. P.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

BENDING AND STRAIGHTENING ROLLS.

Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.
Wood & Co., R. D.....Philadelphia.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.

BLOWERS.

American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

BOAT NAILS AND SPIKES.

American Steel & Wire Co.....Chicago.

BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Brooklyn.
Willard, Chas. P. & Co.....Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Bath Iron Works, Ltd.....Bath, Me.
Boyer Water Tube Boiler Co.....New York.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Delaunay, Belleville & Co.....St. Denis, France.
Detroit Screw Works.....Detroit.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Gas Engine & Power Co.....Morris Heights, N. Y.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Building Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roberts Safety Water Tube Boiler Co.....New York.
Stirling, The Co.....Chicago.
Trigg, Wm. R. Co.....Richmond, Va.
Union Iron Works.....San Francisco.
Willard, Chas. P. & Co.....Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.

BOILER FURNACES, FIRE FRONTS, ETC.

Continental Iron Works.....New York.

BOILER RIVETS.

Bourne-Fuller Co.....Cleveland.
Champion Rivet Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BOLT CUTTERS.

Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.

BORING AND TURNING MILLS.

Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons.....Philadelphia.
Fore River Ship & Engine Co.....Quincy, Mass.
Illinois Smelting & Refining Works.....Chicago.
Phosphor Bronze Smelting Co.....Philadelphia.

BRIDGES, BUILDERS OF.

Scherzer Rolling Lift Bridge Co.....Chicago.

BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Machine Co.....Cleveland.
McMyler Mfg. Co.....Cleveland.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

CHAINS.

Monongahela Iron & Steel Co.....Pittsburg.
Newhall Chain Forge & Iron Co.....New York.
Standard Chain Co.....Pittsburg.

CHAIN HOISTS.

Boston & Lockport Block Co.....Boston, Mass.

CHUCKING MACHINES.

Bement, Miles & Co.....Philadelphia.
Niles Tool Works Co.....Hamilton, O.

CHUCKS FOR LATHES, DRILLS AND PLANERS.

Skinner Chuck Co.....New Britain, Conn.

CIRCULATOR, EQUILIBRIUM, with Steam Heating Attachment.

Bloomsburg & Co., H.....Newport News, Va.

CLOCKS (Marine), CHRONOMETERS, BELLS.

Ashton Valve Co.....Boston.
Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.

Castner, Curran & Bullitt.....Philadelphia.
Hanna, M. A. & Co.....Cleveland.
Ohio Fuel Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Pittsburgh Coal Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co.....Buffalo.
Scott Co., The W. L.....Erie, Pa.

COAL AND ORE HANDLING MACHINERY.

Brown Hoisting Machinery Co., Incorporated.....Cleveland.
Lidgerwood Mfg. Co.....New York.

COMPASSES.

Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

COMPASS ADJUSTER.

Fields, J. M.....Cleveland.

CORK JACKETS AND RINGS.

Armstrong Cork Co.....Pittsburgh, Pa.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Brooklyn.

CRANES, CONVEYORS, HOISTS.

Brown Hoisting Machinery Co., Incorporated.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Niles Tool Works Co.....Hamilton, O.
Westinghouse Electric & Mfg. Co.....Pittsburg.
Wood & Co., R. D.....Philadelphia.

CRANK PINS.

Cleveland City Forge & Iron Co.....Cleveland.

DIVING APPARATUS.

Hale Rubber Co., Alfred.....So. Boston, Mass.

DOORS—PNEUMATIC AND ELECTRIC SAFETY POWER DOORS AND HATCHES.

"Long Arm" System Co.....Cleveland.

DRILL PRESSES—DRILLS OF ALL KINDS.

Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.
Pond Machine Tool Co.....Plainfield, N. J.
Pratt & Whitney Co.....Hartford, Conn.

DRILLS, PNEUMATIC.

Standard Pneumatic Tool Co.....Chicago.

DRYING APPARATUS.

American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Sturtevant, B. F. Co.....Boston.

DRY DOCKS.

American Ship Building Co.....Cleveland.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Harlan & Hollingsworth Co.....Wilmington, Del.
Lockwood Mfg. Co.....East Boston, Mass.
Maryland Steel Co.....Sparrow's Point, Md.

Moran Bros. Co.....Seattle, Wash.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Shipowners Dry Dock Co.....Chicago.
Union Iron Works.....San Francisco.

ELECTRIC AUTOMATIC WHISTLE OPERATORS.

Signal & Control Co.....New York.

ELECTRIC LIGHT AND POWER PLANTS.

Buffalo Forge Co.....Buffalo.
Electro-Dynamic Co.....Philadelphia.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Seldler-Miner Electric Co.....Detroit.
Sturtevant, B. F. Co.....Boston.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

ELECTRIC HOISTS AND CRANES.

Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

ELECTRIC STEERING GEAR, SPEED AND RUDDER INDICATORS, ETC.

Electro-Dynamic Co.....Philadelphia.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Chicago Ship Building Co.....Chicago.
Chase Machine Co.....Cleveland.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Lake Shore Engine Works.....Marquette, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Olds Motor Works.....Detroit.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.
Willard, Chas. P. & Co.....Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.
Electro-Dynamic Co.....Philadelphia.
Seldler-Miner Electric Co.....Detroit.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co.....Chicago.
Reilly Repair & Supply Co., James.....New York.

ENGINEERS, MARINE AND MECHANICAL.

Electro-Dynamic Co.....Philadelphia.
Gaskin, Edward.....Buffalo.
Hunt, Robt. W. & Co.....Chicago.
Miller, Walter.....Cleveland.
Pittsburgh Testing Laboratory, Ltd.....Pittsburg.
Powell, Ambrose V.....Chicago.
See, Horace.....New York.
Wood, W. J.....Chicago.

EVAPORATING AND DISTILLING APPARATUS.

Reilly Repair & Supply Co., James.....New York.

FANS FOR VENTILATION, EXHAUST, ETC.

American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert.....Buffalo.
Reilly Repair & Supply Co., James.....New York.
Reynolds, H. J.....Cleveland.

FIRE EXTINGUISHING APPARATUS.

Clayton Fire Extinguishing & Disinfecting Co.....New York.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.

Page Bros. & Co.....Boston.
Porter's Sons' Co., Wm.....New York.

FOG SIGNALS.

Colt Co., J. B.....New York.
Hamilton-Foster Fog Signal Co.....New York.

FORGES.

Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co.....Cleveland.
Fore River Ship & Engine Co.....Quincy, Mass.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

FUELING COMPANIES AND COAL DEALERS.

Castner, Curran & Bullitt (Pocahontas).....Philadelphia.
 Hanna, M. A. & Co.....Cleveland.
 Ohio Fuel Co.....Cleveland.
 Pickands, Mather & Co.....Cleveland.
 Pittsburg Coal Co.....Cleveland.
 Rochester & Pittsburgh Coal & Iron Co.....Buffalo.
 Scott Co., The W. L.....Erie, Pa.
 Smith, Stanley B. & Co.....Detroit.
 Youghiogheny & Lehigh Coal Co.....Chicago.

GAS BUOYS.

Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co.....Cleveland.
 Lake Shore Engine Works.....Marquette, Mich.
 Olds Motor Works.....Detroit.

GAGES, STEAM AND VACUUM.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Crosby Steam Gauge & Valve Co.....Boston.

GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

GRAPHITE BUSHINGS AND BEARINGS.

Graphite Lubricating Co.....Bound Brook, N. J.

HAMMERS, PNEUMATIC.

Standard Pneumatic Tool Co.....Chicago.

HAMMERS, STEAM.

Bement, Miles & Co.....Philadelphia.
 Chase Machine Co.....Cleveland.
 Niles Tool Works Co.....Hamilton, O.

HATCH GEARS.

"Long Arm" System Co.....Cleveland.

HAWERS, WIRE.

American Steel & Wire Co.....Chicago.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Boston.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
 Brown Hoisting Machinery Co., Incorporated.....Cleveland.
 Chase Machine Co.....Cleveland.
 Elwell-Parker Electric Co.....Cleveland.
 General Electric Co.....New York.
 Hodge, S. F. & Co.....Detroit.
 Hyde Windlass Co.....Bath, Me.
 Lidgerwood Mfg. Co.....New York.
 Marine Iron Co.....Bay City.
 Westinghouse Electric & Mfg. Co.....Pittsburg.

HOSE FOR PNEUMATIC TOOLS.

Sayen & Schultz.....Philadelphia.

HYDRAULIC MACHINERY.

Bement, Miles & Co.....Philadelphia.
 Watson-Stillman Co., The.....New York.
 Wood & Co., R. D.....Philadelphia.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Crosby Steam Gauge & Valve Co.....Boston.

IGNITERS FOR GAS ENGINES.

Holtzer-Cabot Electric Co.....Brookline, Mass.

INJECTORS.

Crane Co.....Chicago.
 Jenkins Bros.....New York.

INSURANCE, MARINE.

Brown & Co.....Buffalo.
 Chamberlain & Co., S. R.....Chicago.
 Drake & Maytham.....Buffalo.
 Elphicke, C. W. & Co.....Chicago.
 Helm, D. T. & Co.....Duluth, Minn.
 Hutchinson & Co.....Cleveland.
 Keith, J. G. & Co.....Chicago.
 La Salle & Co.....Duluth.
 Mitchell & Co.....Cleveland.
 Osborn, F. H. & Co.....Chicago.
 Parker, A. A. & W. B.....Detroit.
 Peck, Chas. E. & W. F.....New York and Chicago.
 Richardson, W. C.....Cleveland.
 Sullivan, D. & Co.....Chicago.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.....Cleveland.
 Hanna, M. A. & Co.....Cleveland.
 Pickands, Mather & Co.....Cleveland.

IRON OR STEEL STAYBOLTS, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

LATHES OF ALL KINDS.

Niles Tool Works Co.....Hamilton, O.
 Pratt & Whitney Co.....Hartford, Conn.

LAUNCHES—NAPHTHA, ELECTRIC.

Gas Engine & Power Co.....New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.

Armstrong Cork Co.....Pittsburg.
 Drein, Thos. & Son.....Wilmington, Del.
 Kahnweiler's Sons, D.....New York.
 Lane & DeGroot.....Brooklyn.

LIGHTS, SIDE AND SIGNAL.

Page Bros. & Co.....Boston.
 Porter's Sons' Co., Wm.....New York.

LOGS.

Walker & Son, Thomas.....Birmingham, Eng.
 Also Ship Chandlers.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.....Philadelphia.

MACHINE TOOLS.

Bement, Miles & Co.....Philadelphia.
 Niles Tool Works Co.....Hamilton, O.
 Pond Machine Tool Co.....Plainfield, N. J.
 Pratt & Whitney Co.....Hartford, Conn.

MALLET FOR CAULKERS, BOILER MAKERS, ETC.

N. Y. Mallet & Handle Works.....New York.

MARINE RAILWAYS, BUILDERS OF

Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.

American Blower Co.....Detroit.
 American Ship Building Co.....Cleveland.
 Boston Blower Co.....Hyde Park, Mass.
 Bloomsburg & Co., H.....Newport News, Va.
 Buffalo Forge Co.....Buffalo.
 Detroit Shipbuilding Co.....Detroit.
 Sturtevant, B. F. Co.....Boston.

METALLIC PACKING.

Katzenstein, L. & Co.....New York.
 U. S. Metallic Packing Co.....Philadelphia.

METALS FOR BEARINGS.

Cramp, Wm. & Sons.....Philadelphia.
 Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

METAL POLISH.

Bertram's Oil Polish Co.....Boston, Mass.
 Paul & Co., J. C.....Chicago.

MILLING MACHINES OF ALL KINDS.

Bement, Miles & Co.....Philadelphia.
 Niles Tool Works Co.....Hamilton, O.

NAUTICAL INSTRUMENTS.

Bliss, John & Co.....New York.
 Ritchie, E. S. & Sons.....Brookline, Mass.

NAVAL ARCHITECTS.

Gaskin, Edward.....Buffalo.
 See, Horace.....New York.
 Wood, W. J.....Chicago.

OAKUM.

Stratford Oakum Co., Geo.....Jersey City, N. J.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph.....Jersey City, N. J.
 Standard Oil Co.....Cleveland.

PACKING.

Crane Co.....Chicago.
 Garlock Packing Co.....Palmyra, N. Y.
 Jenkins Bros.....New York.
 Katzenstein, L. & Co.....New York.
 Sayen & Schultz.....Philadelphia.
 U. S. Metallic Packing Co.....Philadelphia.

PAINTS.

Baker, Howard H. & Co.....Buffalo.
 Upson-Walton Co.....Cleveland.

PATENT ATTORNEYS.

Thurston & Bates.....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc.....Philadelphia.

PIPE THREADING AND CUTTING MACHINES.

Merrell Mfg. Co.....Toledo, O.

PIPE, WROUGHT IRON.

Bourne-Fuller Co.....Cleveland.
 Crane Co.....Chicago.

PLANERS OF ALL KINDS.

Bement, Miles & Co.....Philadelphia.
 Niles Tool Works Co.....Hamilton, O.

PLANING MILL MACHINERY.

Atlantic Works, Inc.....Philadelphia.

PLATE BENDING AND PLANING MACHINES.

Bement, Miles & Co.....Philadelphia.
 Cleveland Punch & Shear Works Co.....Cleveland.
 Niles Tool Works Co.....Hamilton, O.
 Wood & Co., R. D.....Philadelphia.

PLUMBING, MARINE.

Reilly Repair & Supply Co., James.....New York.
 Sands, Alfred B. & Son.....New York.

PNEUMATIC TOOLS.

Standard Pneumatic Tool Co.....Chicago.

POLISH FOR METALS.

Bertram's Oil Polish Co.....Boston.
 Paul & Co., J. C.....Chicago.

PRESSURE REGULATORS.

D'Este Co., Julian.....Boston.

PROPELLER WHEELS.

American Ship Building Co.....Cleveland.
 Atlantic Works.....East Boston, Mass.
 Bath Iron Works, Ltd.....Bath, Me.
 Cramp, Wm. & Sons.....Philadelphia.
 Detroit Shipbuilding Co.....Detroit.
 Farrar & Trefts.....Buffalo.
 Fore River Ship & Engine Co.....Quincy, Mass.

Hardy, John B.....Tacoma, Wash.
 Hyde Windlass Co.....Bath, Me.
 Harlan & Hollingsworth Co.....Wilmington, Del.
 Hodge, S. F. & Co.....Detroit.
 Jenks Ship Building Co.....Port Huron, Mich.
 Lockwood Mfg. Co.....East Boston, Mass.
 MacKinnon Mfg. Co.....Bay City, Mich.
 Maryland Steel Co.....Sparrow's Point, Md.
 Moran Bros. Co.....Seattle, Wash.
 Neale & Levy Ship & Engine Bldg. Co.....Philadelphia.
 Newport News Ship Building Co.....Newport News, Va.
 Nixon, Lewis.....Elizabeth, N. J.
 Phosphor Bronze Smelting Co., Ltd.....Wilmington, Del.
 Pusey & Jones Co.....San Francisco.
 Risdon Iron Works.....Milwaukee.
 Sheriffs Mfg. Co.....Richmond, Va.
 Trigg, Wm. R. Co.....Buffalo.
 Trout, H. G.....San Francisco.
 Union Iron Works.....San Francisco.

PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co.....Cleveland.
 General Electric Co.....Schenectady, N. Y.
 Rushmore Dynamo Works.....Jersey City, N. J.
 Seidler-Miner Electric Co.....Detroit.
 Westinghouse Electric & Mfg. Co.....Pittsburg.

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co.....New York.
 Kingsford Foundry & Machine Works.....Oswego, N. Y.
 Wood, R. D. & Co.....Philadelphia.
 Worthington, Henry R.....New York.

PUNCHES, RIVETERS, SHEARS.

Bement, Miles & Co.....Philadelphia.
 Cleveland Punch & Shear Works Co.....Cleveland.
 Niles Tool Works Co.....Hamilton, O.
 Wood, R. D. & Co.....Philadelphia.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register.....Cleveland.

RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co.....Cleveland.
 Champion Rivet Co.....Cleveland.

RIGGING ROPE (WIRE).

American Steel & Wire Co.....Chicago.

RUBBER GOODS.

Hale Rubber Co., Alfred.....So. Boston, Mass.

RUBBER INSULATED WIRES.

Roebling's Sons, John A.....New York and Cleveland.
 American Steel & Wire Co.....Chicago.

SAFETY VALVES.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Crosby Steam Gauge & Valve Co.....Boston.

SAIL MAKERS.

Baker, Howard H. & Co.....Buffalo.
 Upson-Walton Co.....Cleveland.
 Wilson & Silsby.....Boston.

SALVAGE COMPANIES.

See wrecking companies.

SEAM COMPOSITION AND ELASTIC SEAM PAINT.

Cole & Kuhls.....Brooklyn.

SEARCH LIGHTS.

Elwell-Parker Electric Co.....Cleveland.
 General Electric Co.....Schenectady, N. Y.
 Rushmore Dynamo Works.....Jersey City, N. J.
 Seidler-Miner Electric Co.....Detroit.
 Westinghouse Electric & Mfg. Co.....Pittsburg.

SHAPERS.

Bement, Miles & Co.....Philadelphia.
 Niles Tool Works Co.....Hamilton, O.
 Pratt & Whitney Co.....Hartford, Conn.

SHEARS.

See punches, riveters and shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.....Cleveland.

SHIP BUILDERS.

American Ship Building Co.....Cleveland.
 Atlantic Works.....East Boston, Mass.
 Bath Iron Works, Ltd.....Bath, Me.
 Buffalo Dry Dock Co.....Buffalo.
 Cramp, Wm. & Sons.....Philadelphia.
 Craig Ship Building Co.....Toledo, O.
 Chicago Ship Building Co.....Chicago.
 Detroit Shipbuilding Co.....Detroit.
 Fore River Ship & Engine Co.....Quincy, Mass.
 Hardy, John B.....Tacoma, Wash.
 Harlan & Hollingsworth Co.....Wilmington, Del.
 Jenks Ship Building Co.....Port Huron, Mich.
 Lockwood Mfg. Co.....East Boston, Mass.
 Maryland Steel Co.....Sparrow's Point, Md.
 Moran Bros. Co.....Seattle, Wash.
 Neale & Levy Ship & Engine Bldg. Co.....Philadelphia.
 Newport News Ship Building Co.....Newport News, Va.
 Nixon, Lewis.....Elizabeth, N. J.
 Pusey & Jones Co.....Wilmington, Del.
 Risdon Iron Works.....San Francisco.
 Roach's Ship Yard.....Chester, Pa.
 Trigg, Wm. R. Co.....Richmond, Va.
 Union Iron Works.....San Francisco.
 Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co.....Buffalo.
 Moran Bros. Co.....Seattle, Wash.
 Reilly Repair & Supply Co., James.....New York.
 Upson-Walton Co.....Cleveland.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

SPARS—LARGE SIZES.

Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSEL FOR SALE.

Holmes, Samuel.....New York.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.....New York.
 Cleveland & Buffalo Transit Co.....Cleveland.
 Dominion Line.....Boston.
 Erie & Western Trans. Co.....Buffalo.
 International Nav. Co.....Philadelphia.
 Red Star Line.....New York.

STEEL CASTINGS.

Seaboard Steel Casting Co.....Chester, Pa.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
 Chase Machine Co.....Cleveland.
 Detroit Shipbuilding Co.....Detroit.
 Electro-Dynamic Co.....Philadelphia.
 Hyde Windlass Co.....Bath, Me.
 Jenks Ship Building Co.....Port Huron, Mich.
 Queen City Engineering Co.....Buffalo.
 Sheriffs Mfg. Co.....Milwaukee.

STOCKS, BONDS, SECURITIES.

Wright, Herbert & Co.....Cleveland.

STOCKLESS ANCHORS.

Baldt Anchor Co.....Chester, Pa.
 International Anchor Co.....Cleveland.

SUBMARINE DIVING APPARATUS.

Hale Rubber Co., Alfred.....So. Boston, Mass.

SURVEYORS, MARINE.

Gaskin, Edward.....Buffalo.
 See, Horace.....New York.
 Wood, W. J.....Chicago.

TELEGRAPH—DECK AND ENGINE ROOM.

Cory, Chas. & Son.....New York.

TESTS OF MATERIAL.

Hunt, Robert W. & Co.....Chicago.
 Pittsburgh Testing Laboratory, Ltd.....Pittsburg.

THERMOMETERS FOR MECHANICAL PURPOSES.

Helios-Upton Co.....Peabody, Mass.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Bement, Miles & Co.....Philadelphia.
 Cleveland Punch & Shear Works Co.....Cleveland.
 New Doty Mfg. Co.....Janesville, Wis.
 Niles Tool Works Co.....Hamilton, O.
 Pond Machine Tool Co.....Plainfield, N. J.
 Pratt & Whitney Co.....Hartford, Conn.
 Standard Pneumatic Tool Co.....Chicago.
 Watson-Stillman Co.....New York.
 Wood, R. D. & Co.....Philadelphia.

TOOLS, WOOD WORKING.

Atlantic Works, Inc.....Philadelphia.

TOPOPHONE—Prevents disasters in fogs.

Colt Co. J. B.....New York.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.
 Chase Machine Co.....Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co.....Kingston, Ont.
 Midland Towing & Wrecking Co., Ltd.....Midland, Ont.
 Swain Wrecking Co.....Detroit.

TRAPS, STEAM.

D'Este Co., Julian.....Boston.
 Haines Co., Wm. S.....Philadelphia.

TRUCKS.

Boston & Lockport Block Co.....Boston.

TUBING, SEAMLESS.

Benedict & Burnham Mfg. Co.....Waterbury, Conn.
 Standard Seamless Tube Co.....Pittsburg.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Crane Co.....Chicago.
 Crosby Steam Gauge & Valve Co.....Boston.
 D'Este Co., Julian.....Boston.
 Jenkins Bros.....New York.
 Wood & Co., R. D.....Philadelphia.

VARNISH PAINT.

Mair, John & Son.....Philadelphia.

VESSEL AND FREIGHT AGENTS.

Boland, John J.....Buffalo.
 Brown & Co.....Buffalo.
 Chamberlain & Co., S. R.....Chicago.
 Drake & Maytham.....Buffalo.
 Elphicke, C. W. & Co.....Chicago.

Hall & Root.....Buffalo.
 Helm, D. T. & Co.....Duluth, Minn.
 Holmes, Samuel.....New York.
 Hutchinson & Co.....Cleveland.
 Keith, J. G. & Co.....Chicago.
 Kennedy Hunter & Co.....Antwerp.
 Mitchell & Co.....Cleveland.
 Richardson, W. C.....Cleveland.
 Sullivan, D. & Co.....Chicago.

VENTILATING APPARATUS FOR SHIPS.

American Blower Co.....Detroit.
 Boston Blower Co.....Hyde Park, Mass.
 Buffalo Forge Co.....Buffalo.
 Sturtevant, B. F. Co.....Boston.

WIRE ROPE AND WIRE ROPE FITTINGS.

American Steel & Wire Co.....Chicago.
 Baker, H. H. & Co.....Buffalo.
 Roebling's Sons, John A.....New York and Cleveland.
 Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Crosby Steam Gauge & Valve Co.....Boston.
 Signal & Control Co.....New York.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
 American Ship Building Co.....Cleveland.
 Hyde Windlass Co.....Bath, Me.
 Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
 Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co.....Kingston, Ont.
 Midland Towing & Wrecking Co., Ltd.....Midland, Ont.
 Swain Wrecking Co.....Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.

Wilson & Silsby.....Boston.

YACHT AND BOAT BUILDERS.

Dreih, Thos. & Son.....Wilmington, Del.
 Gas Engine & Power Co.....New York.
 Lane & DeGroot.....Brooklyn.
 Willard, Chas. P. & Co.....Chicago.

YAWLS.

Dreih, Thos. & Son.....Wilmington, Del.
 Lane & DeGroot.....Brooklyn.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

Almy Water Tube Boiler Co..... 11	Detroit Shipbuilding Co..... 1	Kahnweiler's Sons, David..... 4	Red Star Line..... 7
American Blower Co..... 40	Detroit Screw Works..... 11	Katzenstein, L. & Co..... 4	*Reilly Repair & Supply Co., James..... 10
American Line..... 7	Dixon Crucible Co., Joseph..... 9	Keith, J. G. & Co..... 34	Reynolds, H. J..... 9
American Ship Building Co..... 1	Dominion Line..... 12	Kennedy Hunter & Co..... 3	Richards, Mills & Co..... 12
American Ship Windlass Co..... 2	Donnelly Salvage & Wrecking Co..... 32	Kingsford Foundry & Machine Works.. 30	Richardson, W. C..... 34
American Steam Gauge Co..... 1	Drake & Maytham..... 34		Risdon Iron Works..... 5
American Steel & Wire Co..... 1	Dreih, Thos. & Son..... 4		*Ritchie & Sons, E. S..... 30
Armstrong Cork Co..... 40	Duluth, South Shore & Atlantic Ry..... 39		Roach's Ship Yard..... 5
Ashton Valve Co..... 12		Lake Shore Engine Works..... 1	Roberts Water Tube Boiler Co..... 11
Atlantic Works..... 5		Lane & DeGroot..... 4	Rochester & Pittsburgh Coal & Iron Co. 33
*Atlantic Works, Inc..... 7		*Learnmonth, Robert..... 30	*Roebling's, John A. Sons Co..... 40
		Lidgerwood Mfg. Co..... 10	Rushmore Dynamo Works..... 4
Babcock & Wilcox Co..... 11		Lockwood Mfg. Co..... 4	
Baldt Anchor Co..... 9		*"Long Arm" System Co..... 3	
Baker, Howard H. & Co..... 6		L. S. & M. S. Ry..... 39	
Bath Iron Works, Ltd..... 1			Safety Car Heating & Lighting Co..... 31
Bement, Miles & Co..... 3	Falls Hollow Staybolt Co..... 4	MacDonald, Ray G..... 34	Sands, Alfred B. & Son..... 10
Benedict & Burnham Mfg. Co..... 28	Farrar & Trefts..... 5	MacKinnon Mfg. Co..... 8	Sayen & Schultz..... 1
Bertram's Oil Polish Co..... 1	Fields, J. M..... 34	Mair, John & Son..... 6	Scherzer Rolling Lift Bridge Co..... 6
Big Four Railway..... 39	Fletcher, W. & A. Co..... 4	*Marine Iron Co..... 7	Scott Co., The W. L..... 32
Blake, Geo. F., Mfg. Co..... 9	Fogg, M. W..... 31	Martin-Barriss Co..... 8	Seaboard Steel Casting Co..... 28
*Bliss, John & Co..... 30	Fore River Ship & Engine Co..... 5	Maryland Steel Co..... 5	See, Horace..... 34
*Bloomsburg & Co., H..... 31		Merrell Mfg. Co..... 5	Seidler-Miner Electric Co..... 8
Boland, J. J..... 31		Midland Towing & Wrecking Co., Ltd.. 40	Sheriffs Mfg. Co..... 10
Boston Blower Co..... 4		Miller, Walter..... 9	Shipowners Dry Dock Co..... 12
*Boston & Lockport Block Co..... 40	Garlock Packing Co..... 28	Mitchell & Co..... 34	*Signal & Control Co..... 7
*Boyer Water Tube Boiler Co..... 31	Gas Engine & Power Co. and Chas. L. 31	Monongahela Iron & Steel Co..... 3	Skinner Chuck Co..... 3
Bourne-Fuller Co..... 12	Seabury & Co., Consolidated..... 31	*Moran Bros. Co..... 39	Smith, Stanley B. & Co..... 33
Brown & Co..... 34	Gaskin, Edward..... 34		Standard Chain Co..... 10
Brown Hoisting Machinery Co., Inc.. 2	General Electric Co..... 12		*Standard Oil Co..... 6
Buffalo Dry Dock Co..... 11	Gilchrist, Albert J..... 34		Standard Releasing Hook Co..... 2
Buffalo Forge Co..... 12	*Gleason-Peters Air Pump Co..... 29		*Standard Pneumatic Tool Co..... 29
	Goertz, G. P..... 9	Neafie & Levy Co..... 5	Standard Seamless Tube Co..... 29
	Gould, Holding & Masten..... 34	*Newhall Chain Forge & Iron Co..... 30	Stirling Co..... 11
	Graphite Lubricating Co..... 9	Newport News Ship Building & Dry 30	Stowe & Graydon..... 34
	Great Lakes Register..... 7	Dock Co..... 5	Stratford Oakum Co., Geo..... 31
		New York Mallet & Handle Works..... 30	Sturtevant, B. F. Co..... 40
		Niles Tool Works Co..... 3	Sullivan & Co..... 34
		Nixon, Lewis..... 5	Swain Wrecking Co..... 32
		North River Iron Works..... 4	
			Thurston & Bates..... 34
			Trigg Co., Wm. R..... 4
			Trout, H. G..... 9
			Union Iron Works..... 5
			Upson-Walton Co..... 40
			U. S. Metallic Packing Co..... 40
			Walker, Thomas & Son..... 3
			Watson-Stillman Co..... 39
			Westinghouse Electric & Mfg. Co..... 6
			Wheeling & Lake Erie R. R..... 59
			White, Johnson, McCaslin & Cannon.. 34
			Willard, Chas. P. & Co..... 30
			Wilson, Thomas..... 34
			Wilson & Silsby..... 6
			Wood, W. J..... 34
			*Wood & Co., R. D..... 30
			Worthington, Henry R..... 9
			Wright, Herbert & Co..... 34
			Youghiogheny & Lehigh Coal Co..... 33

Dearborn Drug & Chemical Works..... 30
 D'Este Co., Julian..... 3
 Delauney, Belleville & Co..... 27
 Delaware River Iron S. B. & E. Works. 5

International Anchor Co..... 9
 International Navigation Co..... 7
 Jenkins Brothers..... 6-10
 Jenks Ship Building Co..... 39

Queen City Engineering Co..... 10

MORAN BROS. COMPANY

SEATTLE, WASHINGTON

SHIP AND ENGINE BUILDERS
STEEL AND WOOD VESSELS, STEAM OR SAIL
FOR OCEAN, SOUND AND RIVER SERVICE

FOUNDRY, MACHINE, BOILER AND FORGE SHOPS
LARGEST TOOLS AND EQUIPMENT TO ANY REQUIREMENT
HEAVY FORGINGS A SPECIALTY

DRY DOCK AND MARINE RAILWAY

Two-Section balanced floating dry dock, 400 ft. long, 60 ft. between towers; patent steel wedge keel blocks; 12,000 tons displacement.
CAPACITY OF MARINE RAILWAY 1500 TONS

SHIP CHANDLERY, ENGINEERS' SUPPLIES

SAW AND PLANING MILL

CAPACITY: TIMBER, 48 INCHES SQUARE, 125 FEET LONG
Including every description of ROUGH, DRESSED or KILN DRIED
YELLOW FIR, RED CEDAR or SPRUCE
We make a specialty of long and large timber and can DRESS FOUR SIDES 20 x 30 INCHES.

SPARS THE LONGEST, LARGEST, CLEANEST AND BEST IN THE
PILES OR TIMBER OF ANY DESCRIPTION.

CARS FROM ALL TRANSCONTINENTAL ROADS
ENTER OUR YARDS AND DOCKS

DOCK SHIPMENTS TO ALL PARTS OF THE WORLD

ELECTRIC CRANE Capacity to transfer 75 tons from car to vessel
WE INVITE CORRESPONDENCE

WANTED, FOR SALE, FOR CHARTER, Etc.

Space under this heading 25 cents a line, each insertion, for three insertions or less. Special rates for periods of more than three insertions.

—WANTED—Foreman who understands steel boat construction and the use of modern tools as applied to yachts of 30 to 150 ft. length. Racine Boat Mfg. Co., Racine, Wis. July 11.

—FOR SALE—Wood hull tug of 61 ft. length and 14 ft. 8 in. beam. Engine 16 1/4 x 18 in. Boiler pressure, 140 lbs. Price \$2,600. C. H. Strong & Son, Cuyahoga building, Cleveland, O. July 25.

—FOR SALE—Second-hand Wells balanced quadruple expansion engine. Size 8, 12, 16 and 24 by 18 in. Price, \$1,000. Fore River Ship & Engine Co., Quincy, Mass. July 18.

—FOR SALE—Passenger steamer Hattie, capacity 250 passengers, 100 tons of freight. John Stevenson, Detroit, Mich. July 11

—FOR SALE—New locomotive fire-box boiler. Fire-box 84 1/2 in. long, 89 in. high, 64 in. wide. Contains 237 2 1/4 in. by 17 ft. iron tubes. Steam drum 36 in. diameter, 11 ft. long. Working pressure, 200 lbs. The S. Freeman & Sons M'n'g. Co., Racine, Wis. tf.

—FOR SALE—Balanced compound marine engines, 20 to 200 H.P. Immediate delivery. Patterns for larger sizes and for quadruple expansion engines. Wells Engineering Co., 136 Liberty street, New York City. July 25.

—WANTED—Agents to call on all consumers of polishes, particularly yachts, steamers, etc. Bertram's Oil Polish Co., Boston, Mass. tf

—FOR SALE—Harbor tugs Owen and Delta. Engines 20x20 and 20 x22 in., respectively. Good boats. Cheap for cash. Ranney Bros., 65 Merwin St., Cleveland. tf.

—FOR SALE—Scott's Coast Pilot, 1901 edition. Great lakes and connecting waters. Fully revised. Price, \$1.50. The Marine Review Pub. Co., Cleveland. tf

—FOR SALE—Charts of all the world. Charts of the great lakes always in stock. United States Hydrographic Office charts, Coast Survey charts, Army Engineer charts. We bind charts and back them with tape, so that they will last for years. The Marine Review Pub. Co., Cleveland. tf

LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CLEVELAND CITY TICKET OFFICE 237 SUPERIOR ST

Eastward:—			Ar. fr. West.	Dep. East.
No. 18, Southwestern Limited	.....			*1 55 am
No. 22, Lake Shore Limited	.....		*2 15 am	*2 20 am
No. 26, Pan-American Express	.....		*5 50 am	*6 00 am
No. 28, New York & Boston Express	.....		*7 40 am	*8 00 am
No. 32, Fast Mail	.....		*11 25 am	*11 30 am
No. 44, Accommodation, via Sandusky	.....		*1 35 pm	
No. 46, Southwestern Express	.....			*3 00 pm
No. 6, Limited Fast Mail	.....		*5 40 pm	*5 45 pm
No. 10, Chicago, New York & Boston Special	.....		*7 35 pm	*7 40 pm
No. 16, New England Express	.....		*10 30 pm	*10 35 pm
No. 2, Day Express	.....		*10 05 pm	*11 30 pm
No. 126, Norwalk Accommodation	.....		*17 55 am	
No. 40, Toledo & Buffalo Accom., via Norwalk	.....		*10 00 am	*11 40 am
No. 106, Conneaut Accommodation	.....			*4 30 pm
Westward:—			Ar. fr. East.	Dep. West.
No. 11, Southwestern Limited	.....		*3 25 am	
No. 15, New York, Boston & Chicago Special	.....		*3 05 am	*3 10 am
No. 21, New York & Chicago Express	.....		*5 10 am	*5 20 am
No. 7, Day Express	.....			*6 30 am
No. 19, The Lake Shore Limited	.....		*7 35 am	*7 40 am
No. 23, Western Express	.....		*11 10 am	*11 15 am
No. 33, Southwestern Express	.....		*12 25 pm	
No. 133, Cleveland & Detroit Express	.....			*12 30 pm
No. 47, Accommodation	.....			*13 00 pm
No. 141, Sandusky Accommodation	.....			*13 10 pm
No. 127, Norwalk Accommodation	.....			*15 10 pm
No. 37, Pacific Express	.....		*7 00 pm	*7 20 pm
No. 25, Southern Express	.....		*9 30 pm	
No. 3, Fast Mail Limited	.....		*10 50 pm	*10 55 pm
No. 115, Conneaut Accommodation	.....		*18 30 am	

*Daily *Daily except Sunday. Trains Nos. 28 and 37 run via Erie station.
"THE ST. LOUIS LIMITED" via "Big-4 Route"
Leaves—CLEVELAND, 8:00 a. m. (Daily).
Arrives—INDIANAPOLIS, 3:10 p. m.
Arrives—ST. LOUIS, 9:45 p. m. same night.
Arrives—KANSAS CITY, 7 next morning.

With Fine Vestibule Coaches, Drawing Room and Dining Cars to Indianapolis and St. Louis, also Coach and Parlor Cars to Columbus and Cincinnati. One of the fastest and finest trains in the country. 5 Fast Trains to Columbus, 4 to Cincinnati, with Sleeping and Dining Cars.

(Daily.)	Trains from and to Cleveland.	Leave.	Arrive.
*Col., Cin., Ind. & St. L.	3:35 am	1:50 am
*Gallion and Intermediate	7:00 am	6:30 pm
*St. L. Ltd., Ind., Col., Cin.	8:00 am	10:25 pm
*Col., Spgld., Day., Ind., Cin.	12:35 pm	2:55 pm
*Indianapolis & St. Louis	1:15 pm	2:30 pm
Gallion to Cleveland		9:00 am
To Gallion and Columbus	4:00 pm	
*Col., Spring., Day., Cin.	9:40 pm	5:50 am

GET TICKETS AT COLLVER'S, 116 EUCLID AVE., CLEVELAND.

THE Marquette ROUTE

DULUTH, SOUTH SHORE AND ATLANTIC RAILWAY.

The Only Line Reaching MARQUETTE, MICH.

"The Queen of Northern Summer Resorts."

Hotel Accommodations thoroughly first-class, headed by the Hotel Superior, the finest Hotel on the Great Lakes.

GEO. B. ROSS, Lessee, HOTEL SUPERIOR, MARQUETTE, MICH.; Proprietor LEXINGTON HOTEL, CHICAGO, ILL.; formerly Manager CHICAGO BEACH HOTEL.

—WRITE THE UNDERSIGNED FOR ILLUSTRATED PUBLICATIONS.—

E. C. OVIATT, Trav. Pass. Agent, 76 Ottawa St., GRAND RAPIDS, MICH. G. A. CLIFFORD, Trav. Pass. Agent, CINCINNATI, OHIO. A. E. EDMONDS, City Pass. Agent, DETROIT, MICH. F. W. SALSBERY, Commercial Agent, PITTSBURG, PA. J. F. LEE, Gen'l Agt. Pass. Dept., 225 So. Clark St., CHICAGO, ILL. GEO. W. HIBBARD, Gen'l Pass. Agent, MARQUETTE, MICH.

W. S. JENKS, President. O. L. JENKS, Vice-Pres. and Treas. A. M. CARPENTER, Sec. and Gen'l Mgr.

The Jenks Ship Building Co.

Office and Machine Shops at Fourth St. Yards: Foot of Lincoln Ave.

PORT HURON, MICH.

Steel and Wood Ship Builders.
Marine Engines and Boilers.

STEAM WINDLASSES,
CAPSTANS AND
STEERING APPARATUS.

PROMPT ATTENTION GIVEN TO REPAIRS OF ALL KINDS
ON SHIPS, ENGINES AND BOILERS.

OPERATES THE ONLY THROUGH
BUFFET PARLOR CAR LINE
Between Cleveland, Canton and Wheeling.
J. N. MERWIN, E. B. COOLIDGE,
A. G. P. A. G. P. A.
CLEVELAND, O.

STURTEVANT ELECTRIC FANS

*In 100 types and sizes.
Special designs for requirements.
We build both fan and motor.
Send for Bulletin H.*

B.F. STURTEVANT CO. BOSTON.
NEW YORK • PHILADELPHIA • CHICAGO • LONDON.

Just from the Press

Patterson's Nautical Encyclopedia

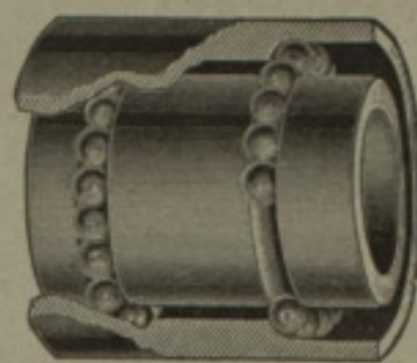
EDITED BY
HOWARD PATTERSON,
AUTHOR OF
SEVERAL SIMILAR WORKS.

Deals with 5,000 subjects. Contains 500 descriptive engravings.
Explains every term in the great mass of sea literature.

Published by the Marine Review Pub. Co., Perry-Payne Building, Cleveland, O.

The Upson-Walton Co.,

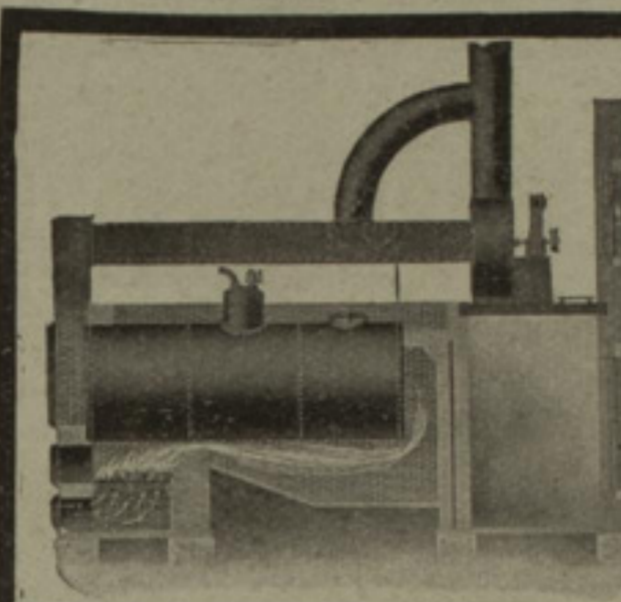
155-161 RIVER STREET, CLEVELAND, OHIO,



SLEEVE SHOWING CONSTRUCTION,
BALL BEARING SHEAVES,
THE LATEST IMPROVEMENT

SELL THE Cleveland Block

TO BE FOUND ON
NEARLY ALL THE MODERN
LAKE VESSELS.



Our New Catalogue No. 118 will tell
how to save money by employing

**Mechanical Draft
COPY MAILED ON REQUEST**

American Blower Company

DETROIT,
MICH.

NEW YORK. CHICAGO.
LONDON.

W. L. CLINE Adv. Dep.

U. S. METALLIC PACKING CO.

429 N. 13th St. PHILADELPHIA PA.

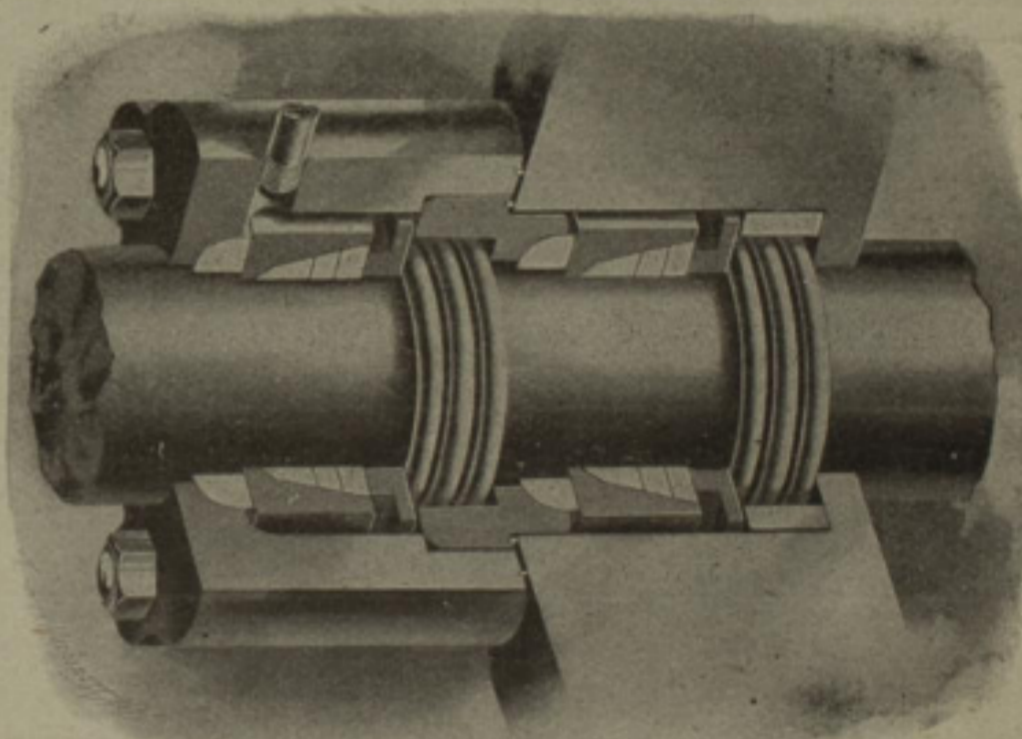
120,000 PACKINGS IN USE.

12,000 APPLIED IN 1899.

Extensively Used on Ocean, Lake, and Stationary Engines.
Cheap, Durable and Small Cost for Repairs.

Silver Medal Awarded Paris, 1900.

SEND FOR CATALOGUE.



RUBBER COVERED WIRES AND CABLES

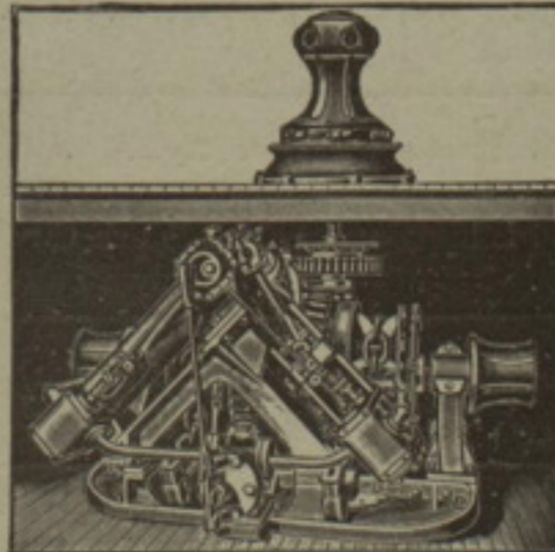
W
I
R
E



R
O
P
E

CLEVELAND STORE, 88 Superior Street.

WINDLASSES AND CAPSTANS



The Hyde Steam and Power
Windlasses and Capstans are the
best in the market.

They have been selected for
most of the vessels now building
for the Navy Department, Re-
venue Marine, Light-house Board
and United States Coast Survey.

They are being furnished for
the majority of the highest class
Steam Ships, Merchant Vessels
and Yachts now building.

HYDE WINDLASS CO., Bath, Me.

LIFE PRESERVERS—BUOYS.

Acme. Solid Cork. Granulated Cork.

EACH PRESERVER stamped by United States Inspector guaranteeing proper
buoyancy. Cork Filled Yacht Fenders. Cork Mooring Buoys. Material
and Finish Guaranteed. Orders filled promptly.

ARMSTRONG CORK COMPANY,

Boston. New York. Philadelphia. Pittsburg. Chicago. St. Louis. Baltimore.

Midland Towing & Wrecking Co., Ltd.

MIDLAND, ONT., CANADA.

JAMES PLAYFAIR, { Pres't and
Gen. Mngr.
D. L. WHITE, Vice-Pres.
J. W. BENSON, Sec'y and Treas.

FIRST-CLASS TUGS FOR WRECKING, RAFT TOWING, ETC.

STEAM PUMPS, DIVERS, JACKS, HAWSERS, LIGHTERS.

LUCK FOR 20th CENTURY IN
MOST POPULAR POCKET
PIECE EVER INVENTED.

Bertram's Polish

EVERY PACKAGE OF BERTRAM'S POLISH, OIL AND PASTE (except 3 and 8-oz. Cans) CONTAINS ONE OF OUR "20TH CENTURY LUCK COINS." TRY A PACKAGE OF THE BEST POLISH IN THE WORLD AND SECURE YOUR CENTURY'S LUCK. ORDER FROM SHIP CHANDLERS AND ENGINEERS' SUPPLIERS.

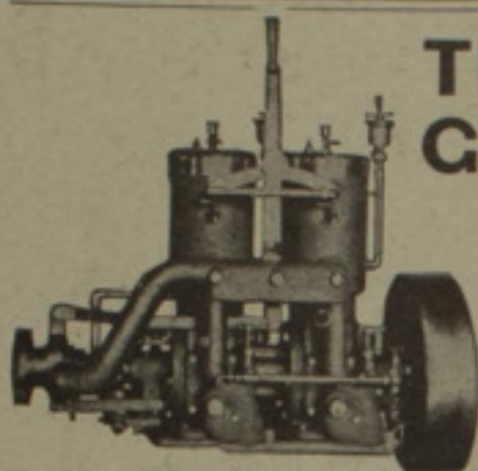
BERTRAM'S OIL POLISH CO., BOSTON, MASS.

MARINE REVIEW

VOL. XXIV.

CLEVELAND, O., JULY 11, 1901.

No. 2.



The Superior Marine Gasoline Engine

IS BUILT FOR HEAVY SERVICE.

Every sail boat and steamer should carry one in a tender. Small schooners save tug bills. One in a delivery boat pays for itself the first year. Built in single, double and triple cylinders. Send for catalogue and description of how it acted in a U. S. life-boat.

LAKE SHORE ENGINE WORKS, Marquette, Mich.

The Wm. Cramp & Sons
Ship and Engine Building Co.
PHILADELPHIA.

SOLE MANUFACTURERS IN AMERICA OF

Parsons Manganese Bronze
AND Parsons White Brass.

EDWARD W. HYDE, President. H. H. McCARTY, Treasurer.
JOHN S. HYDE, Vice-Pres. and Gen'l Supt.

BATH IRON WORKS, Ltd.

Ship Builders and Engineers,
BATH, MAINE.

WIRE HAWSERS RIGGING

AMERICAN STEEL & WIRE COMPANY, - THE ROOKERY, - CHICAGO, ILL.

ALEXANDER McVITTIE, President and Manager.
WILLIAM C. McMILLAN, Vice-President.

CHARLES B. CALDER, General Superintendent.

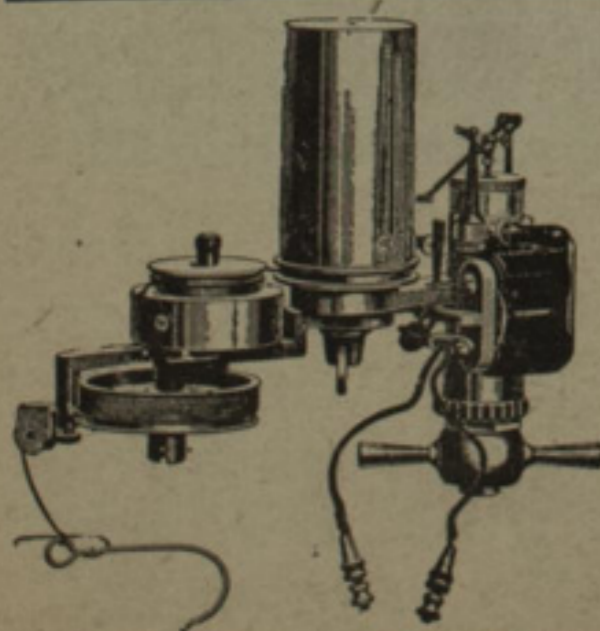
M. E. FARR, Secretary and Treasurer.
FRANK E. KIRBY, Consulting Engineer.

DETROIT SHIPBUILDING COMPANY, SHIP AND ENGINE BUILDERS,

DETROIT, MICH.

Sole Owners for the Lakes and Atlantic Coast of the **HOWDEN HOT DRAFT SYSTEM**,
as applied to Boilers, giving increased power and great economy.

Steel Ship Yard Located at Wyandotte, Mich.
Wooden Ship Yards and Dry Docks, Foot of Orleans
Street, and Foot of Clark Ave., DETROIT, MICH.



American Steam Gauge and Valve Mfg. Co.

(Original Steam Gauge Company.)

New York. BOSTON. Chicago.

MANUFACTURERS OF

**GAUGES THAT GAUGE,
INDICATORS THAT INDICATE,
POPS THAT POP.**

Clocks, Revolution Counters, Whistles,
and all kinds of Steamship Instruments.
Original and only Genuine Thompson
Indicator.

HIGHEST AWARD at the PARIS EXPOSITION.
THE ONLY AMERICAN INDICATOR TO
RECEIVE A MEDAL.

American Thompson Improved Indicator
with Reducing Wheel and Electrical Attachment.

W. L. BROWN, President.
R. L. IRELAND, Vice-president.
R. C. WETMORE, Sec'y and Treas.
JAS. C. WALLACE, Gen'l Manager.

DRY DOCKS IN CLEVELAND:
No. 1, foot Weddell St., 440 ft. x 50 ft. x 16 ft.
No. 2, foot Weddell St., 300 ft. x 55 ft. x 13 ft.
No. 3, Elm St., 340 ft. x 50 ft. x 13 ft.
Dry Dock at Lorain: 560 ft. x 60 ft. x 17 ft.

The American Ship Building Co.

OFFICE, 120 VIADUCT, CLEVELAND, O.

STEEL SHIPS

MARINE AND STATIONARY ENGINES.
BOILERS AND AUXILIARY MACHINERY.

PROMPT ATTENTION GIVEN TO SHIP
REPAIRS OF ALL KINDS.

WORKS AT
CLEVELAND AND LORAIN.

THE ELECTRIC STEERING GEAR.

CIRCULARS AND PRICES ON APPLICATION.

The Electro-Dynamic Co.,

212-226 Ionic Street, Philadelphia, Pa., U. S. A.

Cable Address: EDCO, A B C Code 4th Edition.

GALVANIZED.
STRONGEST.
MOST SATISFACTORY.

POSTAGE AND PRINTING WASTED.

Tons of it fail to reach the right people.

Not so when lists are selected from such reliable publications as the

Blue Book of American Shipping.

1901 EDITION NOW IN PREPARATION.

A directory of everything pertaining to ships. Lists of Ship Owners,
Ship Masters, Ship Builders, Naval Engineers, Marine Engineers.

Advertising rates and other information on application.

THE MARINE REVIEW PUB. CO., CLEVELAND, O.

RUBBER GOODS

"MELVILLE" PATENT SHEET GUM
WITH WIRE GAUZE INSERTION WILL
NOT BLOW OUT.

SAYEN & SCHULTZ,
Mechanical Rubber Works,
PHILADELPHIA, PA.

HOSE, BELTING, VALVES, ETC.,
FLAX AND GUM CORE PACKINGS
FROM FACTORY TO CONSUMER.

THE BROWN HOISTING MACHINERY CO. INCORPORATED

Sole makers of the "Brownhoist" High Speed Cantilever and Gantry Cranes. The most economical cranes for covering large areas in steel works or ship yards.

MACHINERY FOR HANDLING

Structural Work, Marine Plates, etc., in ship building yards.

COAL AND ORE HANDLING MACHINERY.

CRANES OF ALL TYPES.

Steam, electric and hand power.

Eastern Office, 26 Cortlandt St., New York City.

Main Office and Works, CLEVELAND, O., U. S. A.

Pittsburg Office, Carnegie Building, Pittsburg, Pa.

European Office, 39 Victoria St., London, S. W.

GENERATORS **ELWELL-PARKER ELECTRIC CO. OF AMERICA** MANUFACTURERS GUARANTEES QUALITY CLEVELAND, OHIO. MOTORS

STANDARD MARINE GENERATING SETS.

COMPLETE HOISTING AND POWER PLANTS.

AMERICAN SHIP WINDLASS CO.,

P. O. Box 53, PROVIDENCE, R. I.

Send for Catalogue.

Address FRANK S. MANTON, Agent.

Ship Machinery.

Sole Builders of the **ORIGINAL** and **ONLY AUTOMATIC STEAM TOWING MACHINE.**

WILLIAM L. BROWN,
President.

B. W. WELLS,
Vice-President.

O. R. SINCLAIR,
Sec'y and Treas.

JOHN A. UBSDELL, JR.,
Genl. Mngr.

CHICAGO SHIP BUILDING COMPANY,

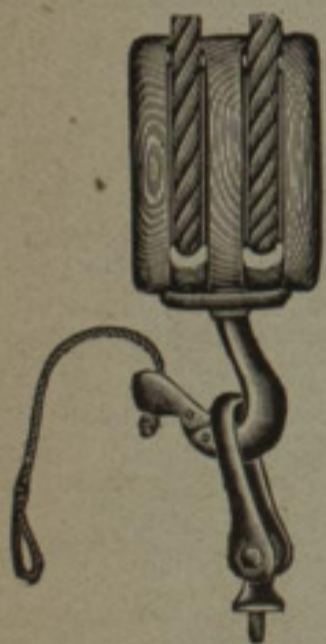
Long Distance Telephones.

Ship Yard and Dry Dock Office,
"South Chicago 40."

Chicago Office, 1125 Rookery,
"Harrison" 1207.

STEEL SHIP BUILDERS AND DRY DOCK PROPRIETORS.

Dry Dock and Yards: 101st St. and Calumet River, CHICAGO, ILL.



Standard Automatic Releasing Device.

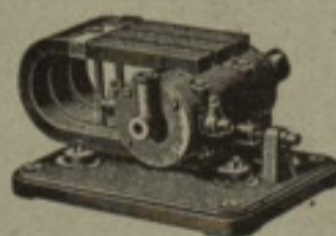
THE FALLS ARE SO ROVE THAT BOTH ENDS OF THE BOAT DETACH, IRRESPECTIVE OF WHICH END STRIKES THE WATER FIRST.

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on.

Standard Automatic Releasing Hook Co.,

NEW CHEESEBROUGH BUILDING,

17 State Street, New York, N. Y.



A BIG FAT SPARK EVERY TIME

if you use our Magneto Igniter. Expense and annoyance of batteries avoided, and continuous, satisfactory operation of gas or gasoline engine assured. Special styles for automobiles and launches.

Send for our new booklet X for full particulars. It will interest you.

THE HOLTZER-CABOT ELECTRIC CO., BOSTON, (Brookline) MASS.
New York Office, 115 Broadway. Chicago Office, 397 Dearborn St.

CRANE FITTINGS

ESTABLISHED 1855

MORISON SUSPENSION BOILER FURNACES

—FOR—

LAND and MARINE BOILERS.

UNIFORM THICKNESS—EASILY CLEANED
UNEXCELLED FOR STRENGTH.

Also Fox Corrugated Furnaces.

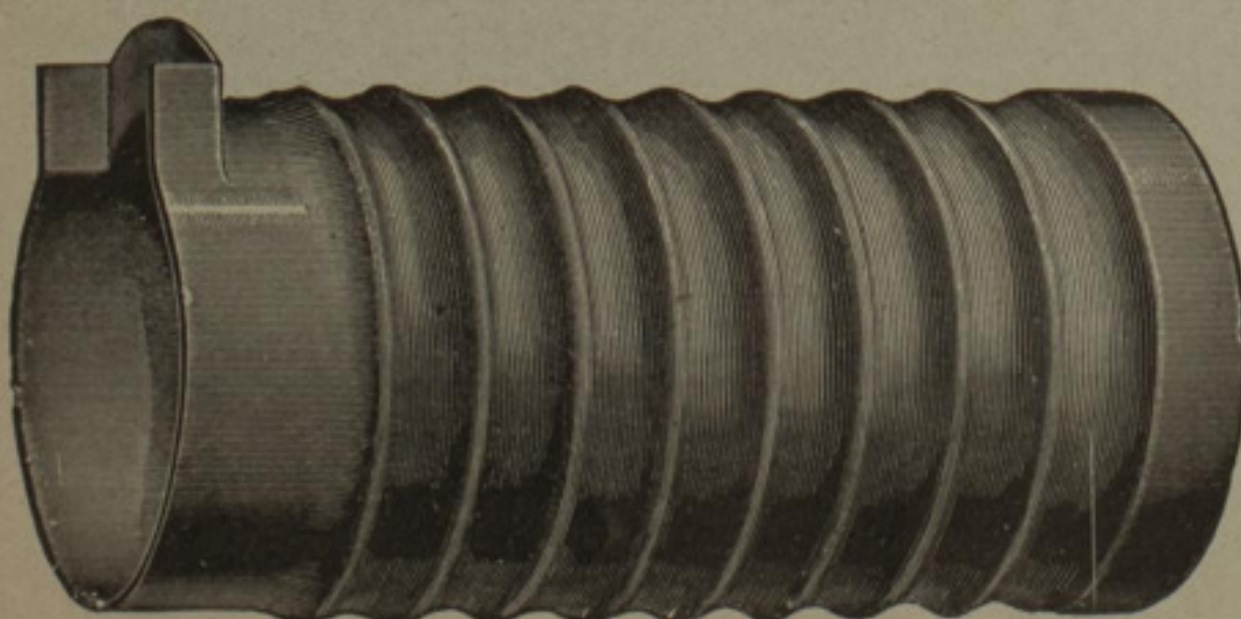
Manufactured by

THE CONTINENTAL IRON WORKS,

West and Calyer Sts. NEW YORK.

Near 10th and 23d Sts. Ferries.

Borough of Brooklyn



THE "LONG ARM" SYSTEM CO.

Cor. Lake and Wason Sts., CLEVELAND, O., U. S. A.

BUILDERS OF

PNEUMATIC
AND
ELECTRIC

**Safety Power Doors and
Hatch Gears for Ships.**

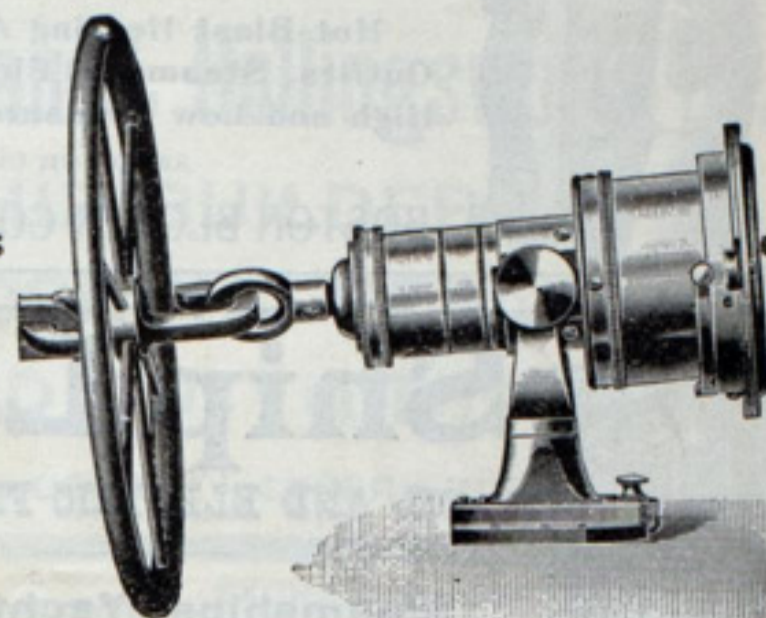
SPECIAL AIR COMPRESSORS FOR MARINE WORK.

THOMAS WALKER & SON, BIRMINGHAM, ENGLAND.

THE
"NEPTUNE"
SHIP-LOG
WITH BALL BEARINGS
FOR
HIGH SPEEDS.

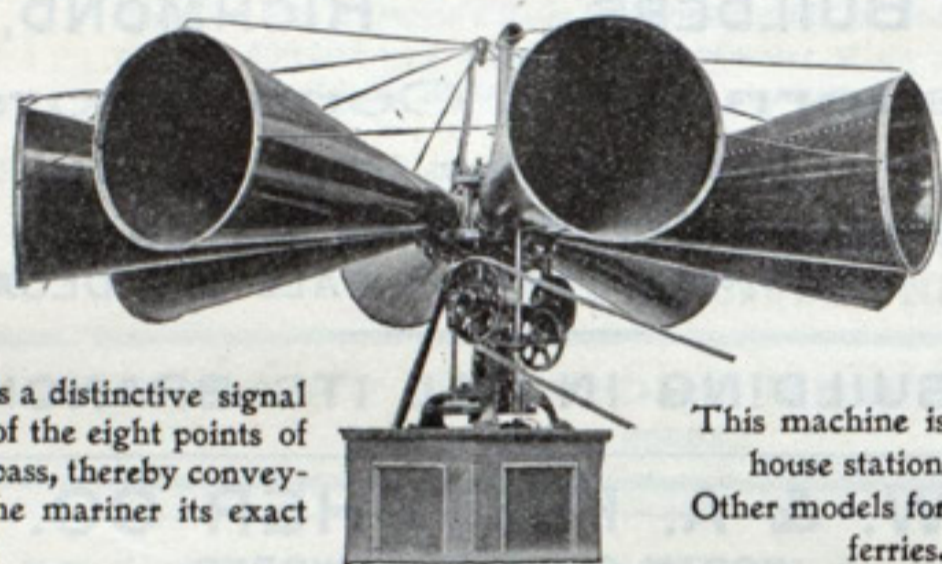
Particulars
on Application.

SOLD BY ALL
SHIP CHANDLERS.



As used in the British Navy.

THE HAMILTON-FOSTER FOG SIGNAL



Directs a distinctive signal
to each of the eight points of
the compass, thereby convey-
ing to the mariner its exact
location.

This machine is for light-
house stations only.
Other models for ships and
ferries.

WRITE FOR DESCRIPTIVE MATTER.

HAMILTON-FOSTER FOG SIGNAL CO.,

No. 11 BROADWAY, (Room 1167,) NEW YORK, N. Y.

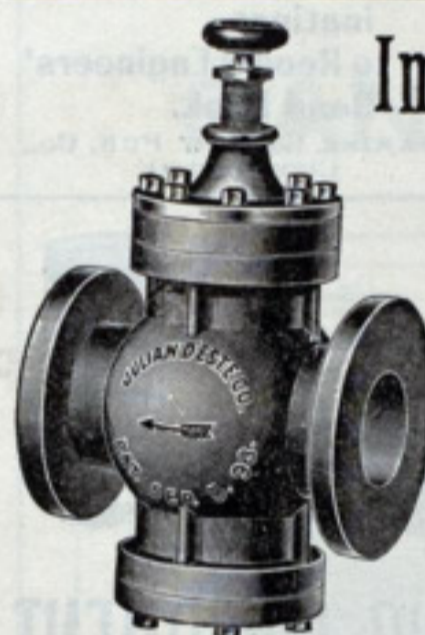
BRITISH ADMIRALTY CHART OF GEORGIAN BAY from Commander Boulton's survey, sent post-paid to any address at \$1.25. Regular price \$1.75. **WHOLE BAY ON ONE SHEET.** Size of sheet, 3 ft. x 3 ft.

THE MARINE REVIEW PUB. CO., PERRY-PAYNE BUILDING, CLEVELAND.

KENNEDY HUNTER & CO., ANTWERP.

SHIP BROKERS, STEAMSHIP AND FORWARDING AGENTS.

AGENTS for BELGIAN, BRAZIL and RIVER PLATE MAIL LINE; MESSRS. LAMPORT & HOLT, of Liverpool; GENERAL STEAM NAVIGATION CO.'S LINE, ANTWERP to LONDON. Regular Lines of Steamers to SPAIN, PORTUGAL, ITALY, MEDITERRANEAN, BLACK SEA, and DANUBE Ports. Direct steamships to BOMBAY and KURRACHEE, CHINA and JAPAN. Direct Sallars to SAN FRANCISCO. Branches:—PARIS, CHARLEROI, BRUSSELS, and RUHRORT.



Improved Pressure Regulator FOR STEAM.

In use on Steamships, for deck machinery, pumps, supplying steam to engines at lower than boiler pressure, for steam heating; or, in any place where it is desired to reduce from a higher to a lower pressure automatically.

SEND FOR CATALOGUE.

JULIAN D'ESTE COMPANY,

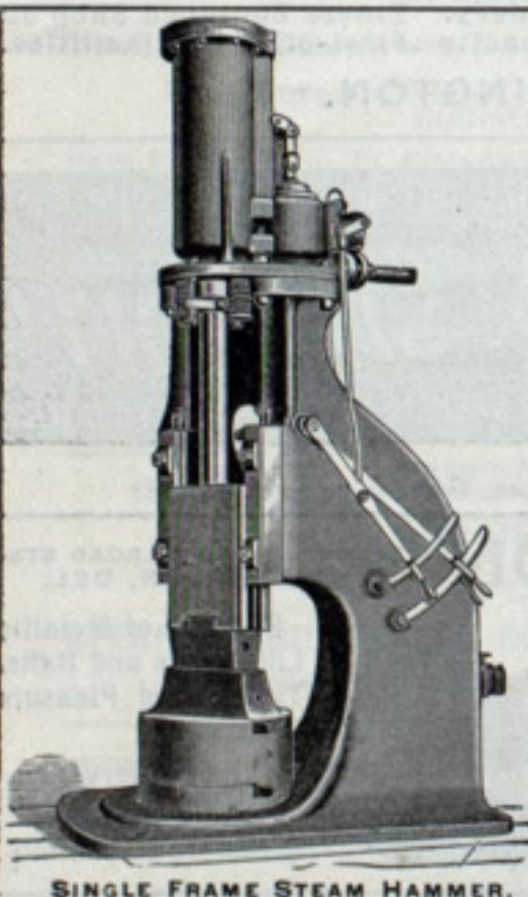
24 Canal Street. BOSTON, MASS

BEMENT, MILES & CO.

MAKE A SPECIALTY OF

Machine Tools

For Ship Building and Repair Yards.



SINGLE FRAME STEAM HAMMER.

NEW YORK:
136-138 Liberty Street.

BOSTON:
65 Oliver Street.

BUFFALO:
Seneca and Wells Streets.

CHICAGO:
Western Union Building.

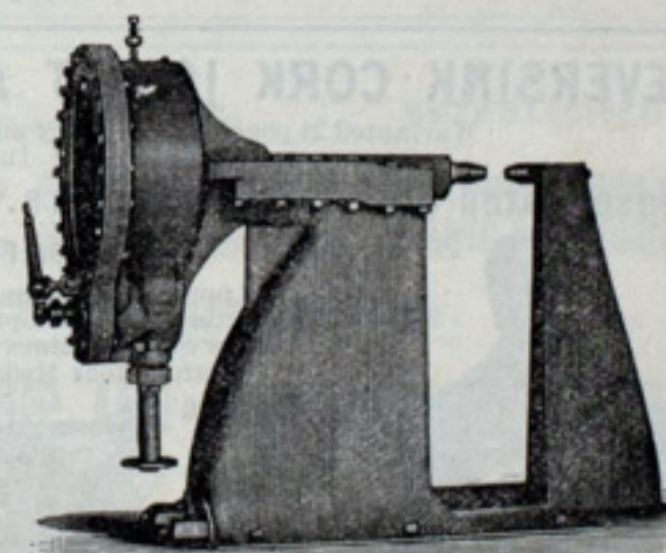
PITTSBURG:
Carnegie Building.

ST. LOUIS:
615 N. Fourth Street.

ALSO A FULL LINE OF
HYDRAULIC MACHINERY.

21st and Callowhill Streets,
PHILADELPHIA, PA.

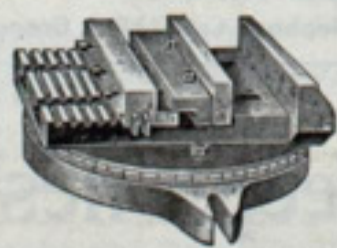
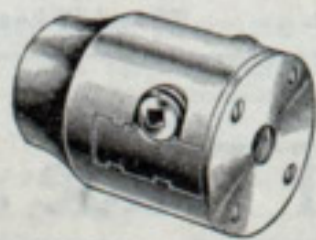
STEAM HAMMERS.



STEAM RIVETER.

SKINNER CHUCKS

For LATHES,
DRILLS and
PLANERS



A finely illustrated Catalogue, 6 x 9, sent to interested parties.

THE SKINNER CHUCK CO.,

340 CHURCH STREET.
NEW BRITAIN, CONN.

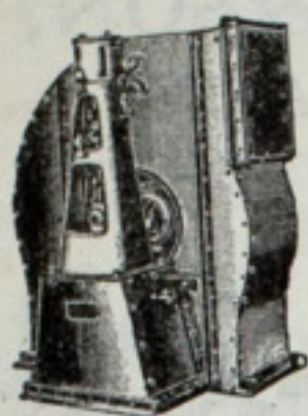
Monongahela Iron and Steel Co.

MANUFACTURERS OF

CHARCOAL **CARTER BRANDS** CHARCOAL
BAR IRON IRON CHAINS
ALL SIZES.

United States Government Specifications Guaranteed.

PITTSBURGH, PA.



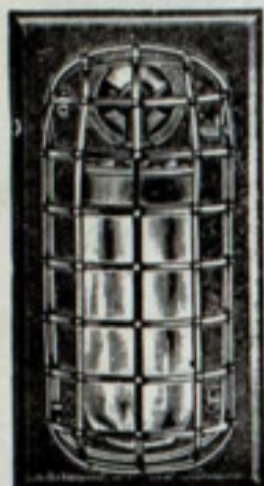
Fan and Pressure Blowers,

EXHAUST FANS FOR ALL USES.

Hot Blast Heating Apparatus, Dry Kiln Outfits, Steam and Electric Fans, Forges, High and Low Pressure Engines.

SEND FOR CIRCULARS.

BOSTON BLOWER CO., Hyde Park, Mass.



Ship Lamps

OIL AND ELECTRIC FIXTURES

FOR

Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.

Prices and Cuts on Application.

PAGE BROS. & CO.

347 to 357 Cambridge St. Boston, Mass.



SEARCH LIGHTS - - -

RUSHMORE PROJECTORS are in almost exclusive use in all classes of service, and are specified for finest Steamers and Yachts.

RUSHMORE DYNAMO WORKS,

TELEPHONE 559.

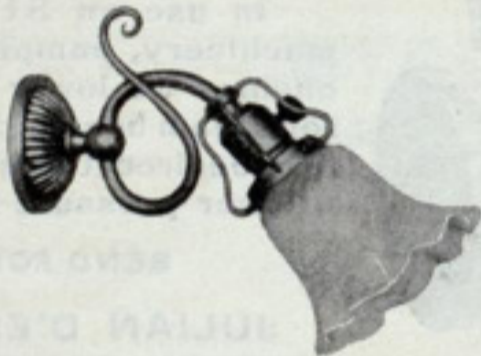
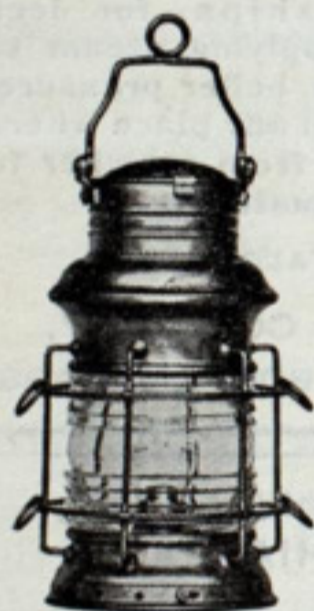
JERSEY CITY.

Reed's Engineers' Hand Book.

Reed's Guide to Examinations.

Key to Reed's Engineers' Hand Book.

MARINE REVIEW PUB. CO., Cleveland, O.



MARINE LIGHTING EQUIPMENT.

WM. PORTER'S SONS' CO.

F. J. RUSSELL, Electrical Engineer.

271 Pearl St., NEW YORK.

NEVERSINK CORK JACKET AND LIFE BELT.

Warranted 24 pounds. Buoyancy and full Weight of Cork, as required by U. S. Inspectors.

Consolidated Cork Life Preservers. Ring Buoys and Fenders.

SAFEST, CHEAPEST.

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.

Metallic and Wooden Life Boats.



Metallic Life Rafts. Marine Drags.

Manufacturers of Woolsey's Patent Life Buoy—the lightest, cheapest and most compact Life Raft known.

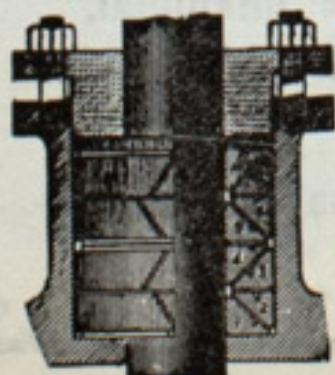
DAVID KAHNWEILER'S SONS

437 Pearl Street, NEW YORK CITY.

Send for Illustrated Catalogue.



KATZENSTEIN'S Self-Acting METAL PACKING,



For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc. Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl Cumming Patent Liquid Rudder Brake. For full particulars and reference, address:

L. KATZENSTEIN & CO.,

General Machinists, Brass Finishers, Engineers' Supplies.

357 West St., New York.

THE LOCKWOOD MANUFACTURING CO. IRON WORKS AND DOCKS,

61 to 85 Sumner Street,

EAST BOSTON, MASS.

BUILDERS OF

Steamships, Tow Boats and Marine Engines.

REPAIRING OF EVERY DESCRIPTION.

Builders of the Celebrated LOCKWOOD PROPELLER WHEELS.

WM. R. TRICC COMPANY,
SHIP BUILDERS, RICHMOND, VA.
Government Contractors,

Building United States Torpedo Boats

SHUBRICK, STOCKTON and THORNTON,

and Torpedo Boat Destroyers DALE and DECATUR.

SHIPBUILDING IN ALL ITS BRANCHES.

W. & A. FLETCHER CO.

NORTH RIVER IRON WORKS.

Marine Engines, Boilers, Etc.

Hudson, 12th and 14th Streets, Hoboken, N. J.

Take Ferry from foot of West 14th Street, N. Y.

JOHN B. HARDY, BUILDER OF
STEAM VESSELS
EITHER STEEL OR WOOD.

All kinds of Marine Engines and Machinery. Finest Equipped Shop on Puget Sound. Marine Shears of 125 tons capacity. First-class rail facilities.

TACOMA, WASHINGTON.

FALLS HOLLOW STAYBOLTS.
ANY SIZE, OUTSIDE OR INSIDE DIAMETER.
AVERAGE LENGTH OF HOLLOW BARS
SIX TO EIGHT FT.
BOTH HOLLOW AND SOLID, MADE OF
THE BEST QUALITY OF CHARCOAL IRON OR STEEL. CUYAHOGA FALLS O. U.S.A.

Guaranteed to pass U. S. Government or Railway Companies Specifications

THOS. DREIN & SON

TATNALL AND RAILROAD STS.
WILMINGTON, DEL.



Builders of Metallic Life Boats and Rafts, Yachts and Pleasure Boats.

Life Preservers.

Outfit for Lake Steamers a Specialty.



Telephone Call 340-B, Greenpoint.

LANE & DeGROOT,
METALLIC LIFE BOATS,

(Formerly Raymond's)

Metallic Life Rafts, Cork Life Preservers, Etc., approved by the U. S. Supervising Inspectors. Also Wood Boats of Every Description. Repairing of every kind promptly attended to.

70 and 72 Kent St., BROOKLYN, NEW YORK.

Keep Files of Trade Journals.

A handy and substantial binder, into which each issue may be securely and neatly placed with trifling effort, may be had at \$1. Thousands of them in use.

THE MARINE REVIEW PUB CO., Perry-Payne Building, Cleveland.

ROACH'S SHIP YARD.

DELAWARE RIVER
—IRON—
SHIP-BUILDING &
ENGINE WORKS,
CHESTER PA.

Builders of Steamships and Marine Machinery.
SHIP-BUILDING IN ALL ITS BRANCHES.
New York Office, Morgan Iron Works, Foot East Ninth St

SHIP AND ENGINE BUILDERS.**Newport News Shipbuilding and Dry Dock Company.**

Equipped with a Simpon's Basin Dry Dock capable of docking a vessel 600 feet long drawing 25 feet of water, at any stage of the tide Repairs made promptly and at reasonable rates.

For estimates and further particulars, address

C. B. ORCUTT, President,
No. 1 BROADWAY, NEW YORK.

WORKS AT NEWPORT NEWS, VA.
(ON HAMPTON ROADS.)

MARYLAND STEEL CO.,

Marine Department.

Ship Builders and Engineers

SPARROW'S POINT, MD.

Baltimore Telephone No. 11.

A. G. WILSON, Manager.

Long Distance Telephone Service Between New York, Philadelphia, Boston and Sparrow's Point Offices.

New York Office: 71 Broadway.

Boston Office: 70 Kilby Street.

Philadelphia Office: 312-319 Girard Building.

The Pusey & Jones Company,

WILMINGTON, DELAWARE.

Builders of IRON AND STEEL STEAMERS, STEAM YACHTS,
TOW BOATS, MARINE ENGINES, BOILERS, TANKS,
AND OF HEAVY MACHINERY GENERALLY.

ALSO COPPERSMITH WORK.

SPECIAL FACILITIES for REPAIRS to both WOODEN and METAL BOATS.
MARINE RAILWAY. NO WHARFAGE CHARGED

Risdon Iron Works,
IRON AND STEEL SHIP BUILDERS,
SAN FRANCISCO.

FORE RIVER SHIP AND ENGINE COMPANY, SUCCESSORS TO
Steel Ship and Marine Engine Builders.

CONTRACTORS FOR { U. S. Torpedo Boat Destroyers Lawrence and Macdonough.
U. S. Protected Cruiser Des Moines.
U. S. Battleships New Jersey and Rhode Island.
U. S. Steam Light-Vessel No. 72.

OFFICE AND WORKS: QUINCY, MASS., U. S. A.

FARRAR & TREETS,

Propeller, Yacht and Tug Wheels.
Marine and Stationary Engines & Boilers.
Repairing Promptly Attended to.
Drilling Boilers and Engines a Specialty.

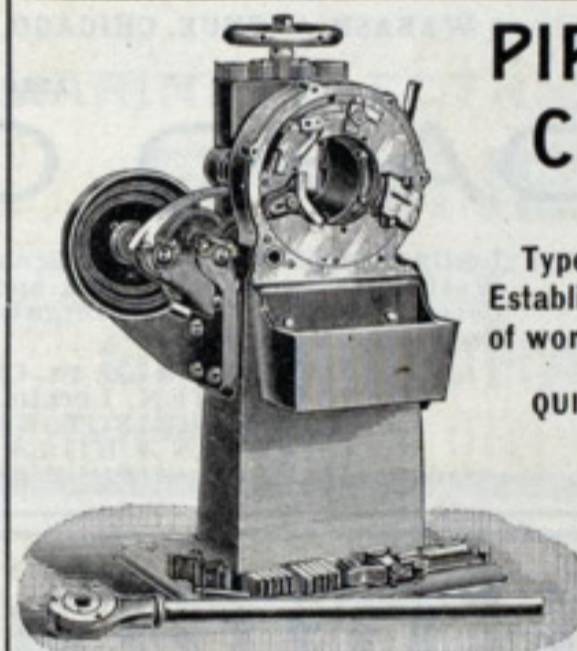
64 to 66 Perry Street, BUFFALO, N. Y.

WORKS AND
MAIN OFFICE, WILMINGTON, DEL.

The Harlan & Hollingsworth Co.
SHIP BUILDERS,
DRY DOCKING, REPAIRING
AND OUTFITTING.

(3-4 CENTURY EXPERIENCE.)

NEW YORK OFFICE, { EXCHANGE COURT BUILDING,
52 BROADWAY, ROOM 702.

UNION IRON WORKS
SHIP BUILDERS,
SAN FRANCISCO.**PIPE THREADING AND
CUTTING MACHINES**

HAND OR POWER.

Types combining all that is LATEST and BEST.
Established reputation for durability and rapidity
of work.

GREAT RANGE OF WORK.
QUICK CHANGE FROM SIZE TO SIZE OF PIPE.
GEARS COMPLETELY HOUSED.

MERRELL MNFG. CO.

SEND FOR CATALOGUE R. Toledo, Ohio,
U. S. A.

MATHIAS SEDDINGER, President.
SOMMERS N. SMITH, Vice-Pres't and Gen'l Mgr.

ESTABLISHED 1838.

THE NEAFIE & LEVY SHIP & ENGINE BUILDING COMPANY,
PENN WORKS.**IRON AND STEEL SHIP AND MARINE ENGINE BUILDERS.**

SOLE MAKERS OF THE WELL KNOWN

PHILADELPHIA PROPELLER WHEEL.

Beach and Palmer Streets, PHILADELPHIA, PA., U. S. A.

The Atlantic Works, BUILDERS OF . . . STEAMSHIPS,
STEAM YACHTS,
TOW BOATS, ETC.
EAST BOSTON, MASS.

Marine Engines, Boilers and Tanks,
Heavy Machinery and Plate Iron Work.

LEWIS NIXON, SHIP BUILDER

Office and Works, ELIZABETH, N. J.

Builder of Stern-wheel, Paddle and Screw Steamers; also Torpedo
Boats and Barges of all kinds in Steel.

A Specialty made of South American and Alaskan River Boats.

CRANE VALVES

ESTABLISHED 1855

Patterson's Nautical Encyclopedia.

Will be in all respects a work up to date, correct as to every term known to the shipping world.

Divided as to departments of Naval Architecture, Marine Engineering, etc.

The latest and bound to be the most complete work of its kind. Best effort of Howard L. Patterson, New York, author of several standard books on marine subjects.

NOW IN PRESS. \$3 PER COPY.

Order from THE MARINE REVIEW PUB. CO., CLEVELAND.

As complete in everything pertaining to naval architecture and marine engineering, as it is in sea terms. No expense spared in illustrations. Special attention given to the modern steel ship. A work that may well be recommended to admiralty lawyers.

WILSON & SILSBY, Rowe's Wharf,
BOSTON, MASS.
MAKERS OF

Sails for Yacht Independence.

— ALSO THE —
OUTFITS OF LARGE STEAM YACHTS.



JENKINS BROS.' VALVES

are manufactured of the best steam metal, and are fully guaranteed. Why experiment with cheap valves? If you want the **BEST** ask your dealer for valves manufactured by Jenkins Brothers. Remember all genuine are stamped with Trade Mark like cut.

JENKINS BROTHERS. New York Philadelphia, Chicago, Boston.

Howard H. Baker & Co.

**SHIP CHANDLERS
AND SAIL MAKERS,**

18 to 26 Terrace

BUFFALO, N. Y.

MARINE VALVE
MINERAL SEAL

DARK LUBRICATING,
ELDORADO ENGINE

RENOWN ENGINE,
HEAD LIGHT

VICTOR SIGNAL,
LARD OILS

AND

ARCTIC CUP GREASES

CARRIED IN STOCK BY THE

STANDARD OIL COMPANY,

5 WABASH AVENUE, CHICAGO, and 123 RIVER STREET, CLEVELAND.

ALSO FOR SALE BY

STANDARD OIL COMPANY,

Muskegon, Mich.
Racine, Wis.
Milwaukee, Wis.
Sheboygan, Wis.

Manistee, Mich.
Manitowoc, Wis.
Green Bay, Wis.
Buffalo, N. Y.

Ludington, Mich.
West Bay City, Mich.
Detroit, Mich.
Escanaba, Mich.

St. Ignace, Mich.
Ashland, Wis.
Kenosha, Wis.

Marinette, Wis.
Oshkosh, Wis.
Duluth, Minn.

West Superior, Wis.
Hancock, Mich.
Marquette, Mich.

Sault Ste. Marie, Mich.
Saginaw, Mich.

ATLANTIC REFINING CO., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. MCKINNON, Ashtabula Harbor, O.
HENRY HULL, Lorain, O.
LAKE ERIE SUPPLY CO., Conneaut, O.

BABY & DALE, St. Clair, Mich.
N. C. ALTEN, Lorain, O.
A. F. HARRINGTON, Conneaut, O.
CHAPMAN & HILLS, Lorain, O.
HARBOR SUPPLY CO., Ashtabula, O.

SCOTT BROS., & DeLISLE, Marine City, Mich.
MARINE SUPPLY CO., Fairport, O.
THE M. I. WILCOX CO., Toledo, O.
SO. CHICAGO SHIP CHANDLERY CO., So. Chicago.

Ship Builders and Ships

SUPPLIED WITH ELECTRICAL APPARATUS

BY

Westinghouse Electric

& Manufacturing Co.

Pittsburg.

All Principal Cities in
U. S. and Canada.

71 B2



NORTH HALSTED ST. SCHERZER ROLLING LIFT BRIDGE, CHICAGO - OPEN.
INVENTED BY WM. SCHERZER, C. E. PATENTED.

Information, preliminary sketches and estimates furnished to responsible parties, upon request, accompanied by the necessary data.

THE SCHERZER ROLLING LIFT BRIDGE CO., 1616 Monadnock Block,
CHICAGO, U. S. A.

TWENTY-SEVEN OTHER LARGE SCHERZER Rolling Lift BRIDGES

In successful use
and under construction
at the present
time.

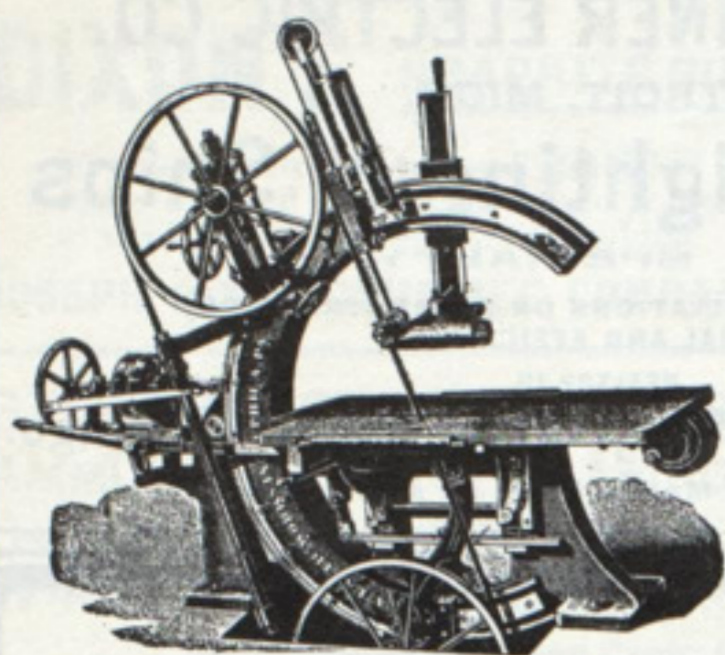
TRY IT ON YOUR BOAT.

A genuine Varnish Paint without gum. Where applied the surface becomes coated as with glass, resisting the influence of weather and of water (salt or fresh) and keeping its gloss for years.

JOHN MAIR & SON, 136 S. Delaware Ave.,
PHILADELPHIA, PA.



IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT
COUPLING LINKS AND PINS PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.



ADJUSTABLE BEVEL BAND SAW.

Will bevel both ways to 45 degrees.
Power movement to change angles.
Power feed in three directions.

ESTABLISHED 1869.

INCORPORATED 1896.

ATLANTIC WORKS INCORPORATED,

Successors to Berry & Orton Company.

2223-25-27 & 29 Arch St., PHILADELPHIA, PA., U. S. A.

MANUFACTURERS OF

MACHINERY FOR WORKING WOOD

FOR USE IN SHIP YARDS,
CAR SHOPS, RAILROAD SHOPS.

SEND FOR CATALOGUE.

ESTIMATES FURNISHED.

Hollow Chisel Mortisers.

Car Sill Dressers.

Thearle's Works

ON SHIP BUILDING.

STANDARDS IN
ENGLAND AND SCOTLAND

KNOWN AND USED WHEREVER STEEL SHIPS ARE BUILT.

SEPARATE VOLUMES FOR PLATES.

"Ship Building in Iron and Steel." (Plates in separate volume.) \$5.25.

"Ship Building and Laying Off." (Plates in separate volume.) \$3.00.

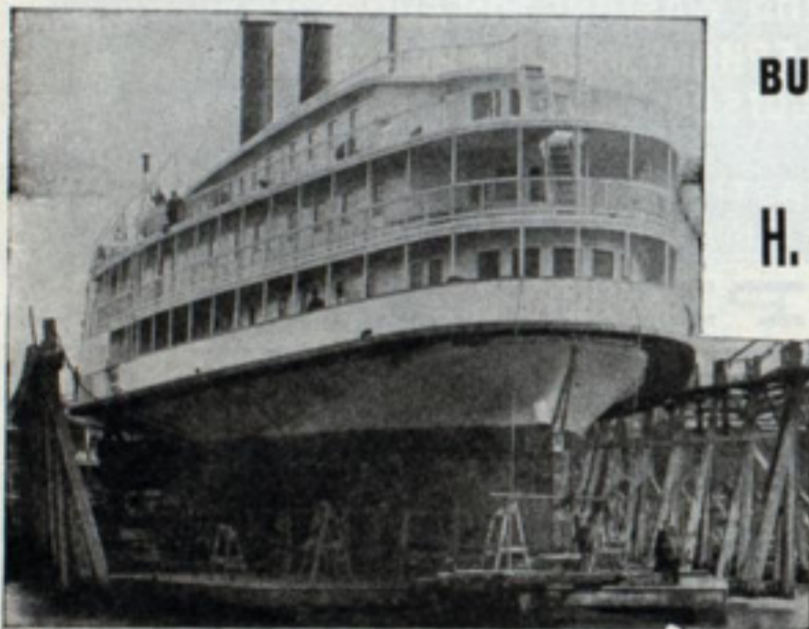
"Theoretical Naval Architecture." (Plates in separate volume.) \$3.50.

"Practical Naval Architecture." (Two volumes.) \$3.00.

THE MARINE REVIEW PUB. CO., CLEVELAND.

BEST FORM OF DRY DOCK.

Crandall's Modern Marine Railways.



SAFE. RAPID.
BUILT OF STEEL OR WOOD
ANY SIZE.

H. I. Crandall & Son Co.
(INCORPORATED.)

Contracting
Engineers,

EAST BOSTON,
MASS., U. S. A.

AMERICAN LINE

NEW YORK
SOUTHAMPTON
LONDON

CALLING AT CHERBOURG WESTBOUND.

Sailing From New York Every Wednesday at 10 A. M.

Steamers: ST LOUIS, ST PAUL, NEW YORK, PHILADELPHIA.

Special Express Train from Southampton to London in one hour and forty minutes.
Close connection at SOUTHAMPTON for Havre and Paris by
special fast twin-screw Channel Steamers.

RED STAR LINE

NEW YORK
ANTWERP
PARIS

Sailing Every Wednesday at 12 Noon.

Steamers: { *VADERLAND, *ZEELAND, KENSINGTON,
SOUTHWARK, FRIESLAND.

* New Twin-screw Steamers calling at Cherbourg eastbound.

One of the Shortest Routes to BELGIUM, HOLLAND, FRANCE, GERMANY,
THE RHINE, SWITZERLAND and ITALY.

Send for

"Facts for Travelers." International Navigation Company

Empire Building, 73 Broadway, New York.

305-307 Walnut St., Philadelphia.
Ske Building, 89 State Street, Boston.
306 F St., N.W., Washington, D. C.

Cor. Dearborn & Washington Sts., Chicago.
Third and Pine Streets, St. Louis.
10-12-14 Washington Ave., S., Minneapolis.
30 Montgomery St., San Francisco.

PIERS: 14 & 15 NORTH RIVER, FOOT OF FULTON ST., NEW YORK.

Three Excellent Little Books FOR MARINE ENGINEERS.

"KEY TO ENGINEERING."

"WHAT AN ENGINEER SHOULD KNOW ABOUT ELECTRICITY."

"ENGINEER'S EPITOME."

Any one of these is worth a dollar. All three may be had for a dollar
from the Marine Review Pub. Co., 418-419 Perry-Payne Building, Cleveland.

NOW READY 200 PAGES

SEND 3 CENTS FOR OUR

NEW CATALOGUE

OF BOOKS ON

MARINE, ELECTRICAL, MECHANICAL
ENGINEERING.

BE SURE TO WRITE CLEARLY YOUR FULL ADDRESS.

SPON & CHAMBERLAIN,

12 Cortlandt Street,

NEW YORK, U. S. A.

Hoisting Engines.

We build them in all sizes from new and improved
designs. Every engine thoroughly tested before leaving
our shop, and guaranteed to be satisfactory in every
case. When in want of a hoist for marine work, dock
work, mining, or any other purpose, kindly permit us
to name you prices. We know we can please you.

Marine Iron Co. BAY CITY, MICH.

Chas. E. & W. F. Peck,

58 William Street,
NEW YORK CITY.

C. T. BOWRING & CO., Ltd.
5 & 6 Billiter Ave., London, E. C., Eng.
AND AT LLOYDS, LONDON.

Royal Insurance Bldg.,
CHICAGO, ILL.

INSURANCE

ALL CLASSES OF MARINE INSURANCE,
BOTH CARGOES AND HULLS.

GREAT LAKES REGISTER

INCORPORATED

COMBINED AND ISSUED IN CONNECTION WITH THE

BUREAU VERITAS

INTERNATIONAL REGISTER OF SHIPPING.

GREAT LAKES REGISTER DESIRES TO ANNOUNCE THAT ITS RAT-
INGS GO BEFORE THE LEADING UNDERWRITERS OF AMERICA
ENGLAND AND FRANCE.

THE SERVICES OF ITS SURVEYORS MAY BE ENGAGED ON HULL AND CARGOES.

F. D. HERRIMAN, SURVEYOR GENERAL,
320-322 PERRY-PAYNE BUILDING, CLEVELAND O

THE CHAMPION RIVET CO.

Government Work
a Specialty



Quality:
Highest Standard.
Finish: Unexcelled.

CLEVELAND, O., U. S. A.

VICTOR BOILER AND STRUCTURAL RIVETS.

SEIDLER-MINER ELECTRIC CO.

DETROIT, MICH.

Electric Lighting of Ships

OUR SPECIALTY.

COMPLETE INSTALLATIONS OR RECONSTRUCTION,
SAFE, SUBSTANTIAL AND EFFICIENT.

DEALERS IN

Marine Electrical Supplies AND Special Fittings.

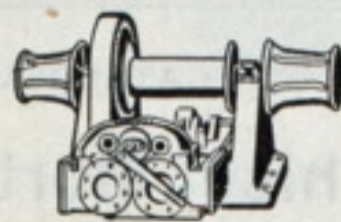
Catalogue and Marine Rules on application.



GASOLINE MARINE ENGINES

Suitable for all Boats from 3½ to 200 HP.
Over 100 in successful use.

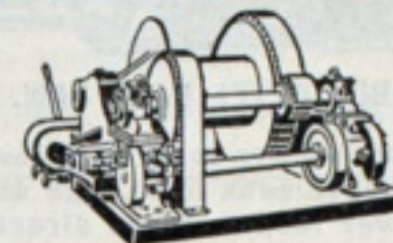
Also the well known and always
reliable Wooters Gas or Gasoline
Stationary Engines.-



HOISTING ENGINES

Of all kinds and sizes, and
for all purposes, especially
for ship use.

Docking and Hauling Engines
and Wire Rope Windlasses.



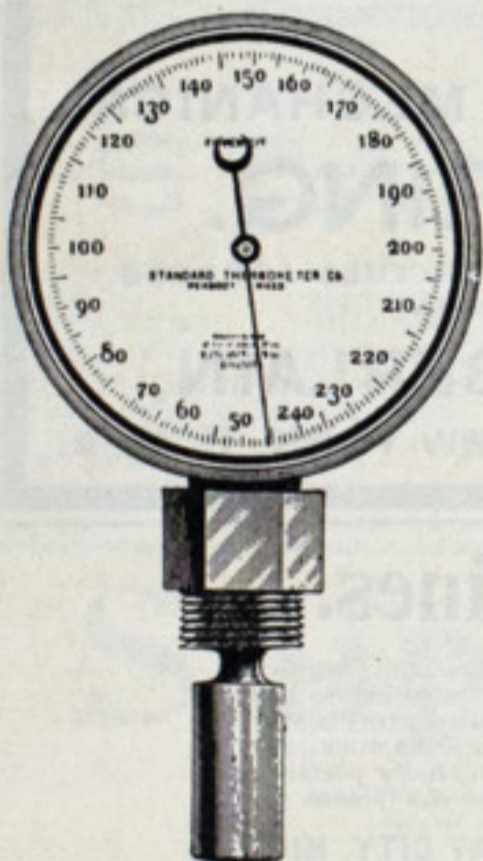
AUTOMATIC TOWING MACHINES

Somewhat the cheapest, and
altogether the best. Positively
guaranteed.

Automatic Fog Whistle Machines
Steam Steering Engines.

FOR THESE AND OTHER WELL KNOWN SPECIALTIES ADDRESS ALL INQUIRIES TO.

THE CHASE MACHINE CO. Engineers and Machinists, CLEVELAND, OHIO.



Helios-Upton Co.

PEABODY, MASS.

Hot Water Thermometers
and Thermometers for
Mechanical Purposes.

Used by U. S. Navy in all New Ships.

Eighty of them furnished
the Japanese Cruisers
"Kasagi" and "Chitose."

SEND FOR BULLETIN No. 40 A.

Shepard's Horse Power Scale.

FOR DETERMINING

HORSE POWER,

SIZE OF CYLINDERS,

DENSITY, TEMPERATURE

AND LATENT HEAT OF STEAM.

OFFERED
AS A PREMIUM
WITH ONE YEAR'S
SUBSCRIPTION
TO THE
MARINE REVIEW
AT \$3.

HAS SOLD IN GREAT NUMBERS AT \$1 EACH.

DELTA METAL



THE PHOSPHOR BRONZE SMELTING CO. LIMITED,
2200 WASHINGTON AVE. PHILADELPHIA.
"ELEPHANT BRAND PHOSPHOR-BRONZE"
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.
— DELTA METAL —
CASTINGS, STAMPINGS AND FORGINGS.
ORIGINAL AND SOLE MAKERS IN THE U.S.

PROPELLERS.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,
AND ALL NATIVE CABINET WOODS.

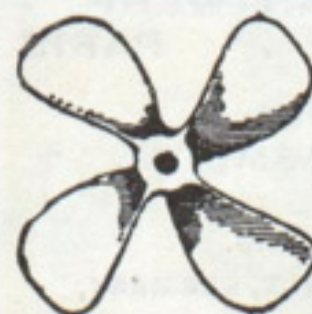
HIGH GRADES OF KILN DRIED WOODS FOR
CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank,

CONSTANTLY ON HAND AND SAWED TO ORDER
ON SHORT NOTICE.

654 Seneca Street,

Cleveland, O.



MacKinnon Manufacturing Co.

Boiler Makers, Founders and Machinists.

Marine Boilers, Engines and Shipyard Machinery. Most
powerful set of Hydraulic Slings on the Lakes. Best
Towing and Speed Propeller Wheels made.

SPECIALTY SMALL YACHT WHEELS.

Works and Office, 224-230 N. Water Street,

BAY CITY, MICH.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.

320 ATWATER STREET,
DETROIT, MICH.

DIXON'S GRAPHITE PIPE JOINT COMPOUND

Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOSEPH DIXON CRUCIBLE COMPANY, JERSEY CITY, N. J.

STEERING GEAR BEARINGS,
AMMUNITION HOIST BEARINGS,
CAPSTAN BEARINGS,
WINDLASS AND WINCH BEARINGS,

REQUIRING
NO OILING
OR
GREASING.

Also Anchor, Davit and Cargo Block Bushings,
Bushings for Sheaves on Wrecking Derricks,
Washers and Collars for Thrust Bearings.

THE GRAPHITE LUBRICATING CO.,
BOUND BROOK, N. J., U. S. A.



The Wonderful TRIEDER BINOCULAR

Has 8 to 10 times the power of the old-style Field and Opera Glass.

IMPORTANT
Owing to the completion of the facilities to mount our Trieder Binoculars at the New York factory the prices will henceforth be as follows, MAGNIFYING

3X	6X	9X	12X
\$38	\$46	\$54	\$62

DISCOUNT CATALOGUE FREE FROM YOUR OPTICIAN, OR FROM
C. P. GOERZ OPTICAL WORKS
52 E. Union St., New York.

AS SEEN WITH THE NAKED EYE.
AS SEEN WITH THE OLD STYLE FIELD GLASS.
As seen with the TRIEDER BINOCULAR.

Pure Feed Water.

Clean Boilers.

Lower Fuel Bills.

Reynolds Feed Water Heater and Purifier

Suited to both Marine and Stationary Boilers.

Prevents formation of scale, removes old scale, and reduces fuel bills.

In use on a number of steam vessels on the Great Lakes.

H. J. REYNOLDS,
721 PERRY-PAYNE BLDG.,
CLEVELAND, O.

DIXON'S Lubricating Graphite

Is fully explained in an INTERESTING AND INSTRUCTIVE PAMPHLET which is FREE to all interested. It will pay all Engineers and Machinists to SEND FOR IT.

JOSEPH DIXON CRUCIBLE COMPANY, JERSEY CITY, N. J.



Established 1837.
Incorporated 1900.

Alfred Hale Rubber Co.
SUCCESSORS TO ALFRED HALE & CO

DIVING APPARATUS
OUR SPECIALTY.

Repair Cloth.
Rubber Cement.

OFFICE AND FACTORY:
387 E. Elghth St.,
SO. BOSTON, MASS.

THE MARINE DEPARTMENT

of the Geo. F. Blake Mfg. Co. take pleasure in announcing that they were awarded the Grand Prix at the recent Exposition at Paris, for their special exhibit of Marine Pumps, Condensers, etc.

Send for new Catalogue of Marine Specialties.

THE GEO. F. BLAKE MFG. CO., 91 Liberty St., N. Y. City.

HENRY R. WORTHINGTON, PUMPING
MARINE AIR AND FEED PUMPS
A SPECIALTY.

BOSTON.
CHICAGO.
PHILADELPHIA.
ST. LOUIS.
BUTTE.

WATER METERS.

120 Liberty St., NEW YORK.

CLEVELAND.
PITTSBURG.
ATLANTA.
SAN FRANCISCO
NEW ORLEANS.



For Decks and all other Seams,
Weather Checks,
Floors, Skylights, Etc.

AND ELASTIC SEAM PAINT
WHITE, BLACK AND COLORS.

IS BEING USED BY
U. S. ARMY TRANSPORTS, AMERICAN LINE, ATLAS LINE,
OCEAN STEAMSHIP CO., OLD DOMINION STEAMSHIP CO.,
FIRE BOAT NEW YORKER, PANAMA RAILROAD STEAMSHIP CO.,
L. BOYER'S SON'S TRANSPORTATION CO.,
NEW YORK & CUBA MAIL STEAMSHIP CO., (WARD LINE),
MERRITT & CHAPMAN D. & W. CO. PENNSYLVANIA RAILROAD CO., Etc.

TO BE BOUGHT OF

Anthony S. Morse, 210 Commercial St., Boston.
Cook & Co., Tacoma, Wash.
Jennison Hardware Co., Bay City, Mich.
J. F. Donahue & Co., Sandusky, O.
The Chas. F. Beebe Co., Portland, Ore.
Geo. B. Carpenter & Co., Chicago, Ill.
Elisha Webb & Sons, 108 S. Delaware, Philadelphia.
H. Steffens, 337-339 Fell St., Baltimore.
Uhler & Co., 7th & K Sts., Washington, D. C.

And all marine hardware stores in New York and Brooklyn.
Samples sent on receipt of 30 cents in stamps. An agent wanted in each seaport town.

COLE & KUHLs, Sole Manufacturers,
Office and Factory, foot of 24th St. [Mention this Paper.] **BROOKLYN, N. Y.**

H. G. TROUT,
KING IRON WORKS,
BUFFALO, N. Y.

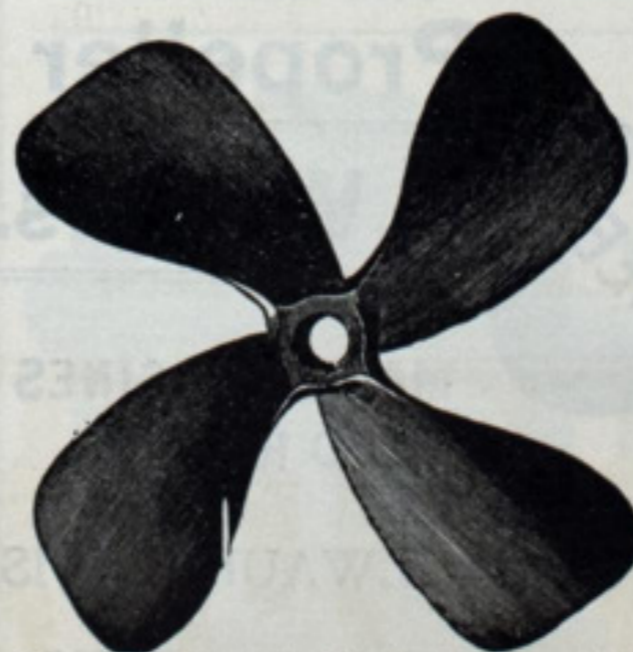
MANUFACTURERS OF

TRIPLE EXPANSION,
FORE-AND-AFT

AND
STEEPLE COMPOUND
MARINE ENGINES,

High and Low Pressure Engines
Sectional Propellers,
Tug and Yacht Wheels.

Cowles Aluminum and Manganese
Bronze Propeller Wheels.



These Wheels are noted for their extra speed, towing power and proportionate saving of coal.
Prices Quoted on Application.

NEW PATENT STOCKLESS ANCHOR

Catalogues
Mailed
Upon
Application.



BALDT PATENT STOCKLESS ANCHOR

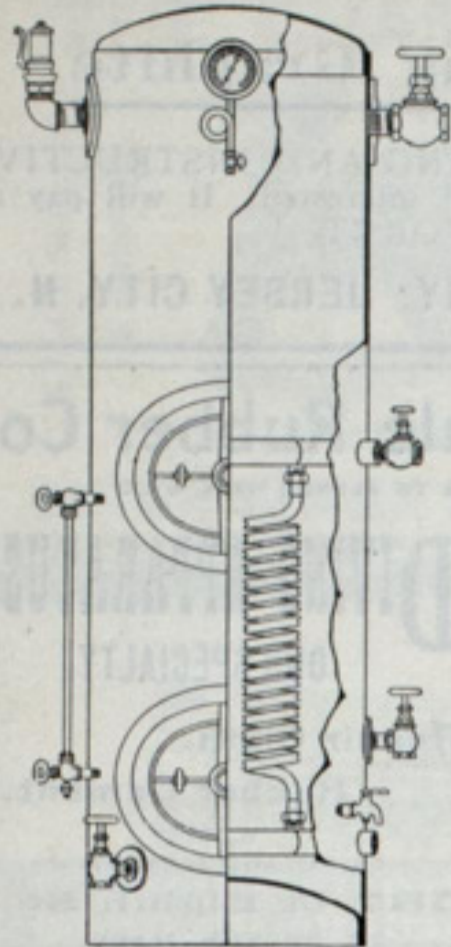
Made of the finest quality of open-hearth steel, and constructed on the ball and socket principle. Many points of superiority over ordinary stockless anchors.

BALDT ANCHOR COMPANY,
CHESTER, PA.

WALTER MILLER PERRY-PAYNE BUILDING,
CLEVELAND, O.

Representative for the Great Lakes.
We keep a large number of Anchors
in stock.





Evaporating and ... Distilling Apparatus

FOR MARINE PURPOSES.

The Most Efficient, Compact, Accessible
and Lightest Made.

GENERAL ENGINEERING SPECIALTIES
AND SUPPLIES.

James Reilly Repair & Supply Co.,
229 and 230 West St., NEW YORK.

SIXTH REVISED EDITION.

Scott's Coast Pilot for 1901.

Great Lakes and Connecting Waters,

AT \$1.50.

For sale by MARINE REVIEW PUB. CO.



Queen City Patent Hydraulic Steerer.

The Best and Most
Reliable.

Generates No Heat
In Pilot House.

Has Large Hand
Wheel.
Can be Changed from
Power to Hand
Steering Instantly.
A Favorite with Pilots.
Send for References.

Queen City Engineering Co., Buffalo, N. Y.

ALFRED B. SANDS & SON

MARINE PLUMBERS
AND MANUFACTURERS OF
Marine Plumbing Specialties.



Marine Water Closet for either above or
below water line.

Folding Lavatories, Ventilators, Pumps,
Tanks, &c., &c.

134 BECKMAN ST., NEW YORK.

THE LIDGERWOOD-MILLER-MARINE CABLEWAY

WILL TRANSFER COAL, AMMUNITION, SUPPLIES AND PROVISIONS,
FROM SHIP TO SHIP AT SEA.



THE ONLY PRACTICAL DEVICE FOR COALING AT SEA.

LIDGERWOOD STEAM AND ELECTRIC HOISTS FOR WAR VESSELS, STEAM-
SHIPS, WAREHOUSES AND DOCKS. Send for Catalogue.

LIDGERWOOD MFG. CO., 96 LIBERTY ST., NEW YORK.

SHERIFFS MANUFACTURING COMPANY

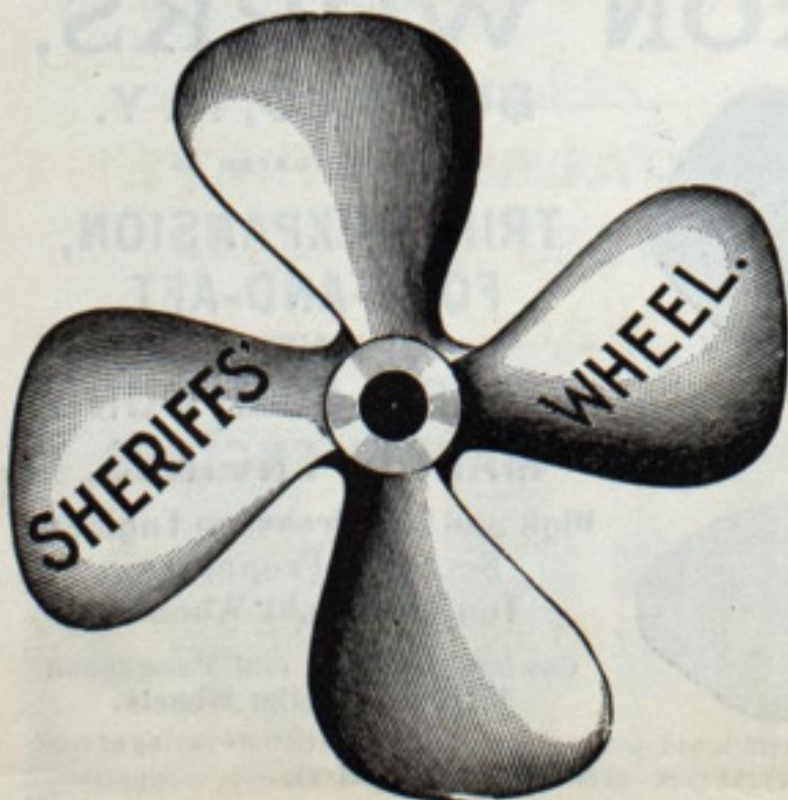
MANUFACTURERS OF

Propeller Wheels.

MARINE ENGINES
AND REPAIRS.

MILWAUKEE, WIS.

TELEPHONE S.-163



THE TOPOPHONE

\$25.00

Prevents Marine
Disasters in Fogs.

Write for circular to

J. B. COLT CO.,

Room 7, 21 Barclay St., N. Y.



MARINE CHAIN

OF ALL KINDS.

*Ships Cables, Dredge Chains,
Stud Link and Marine Railway Chains,
Steam Shovel Chains, Boom Chains, Etc.*

CERTIFICATE OF TEST FURNISHED.

STANDARD CHAIN CO.

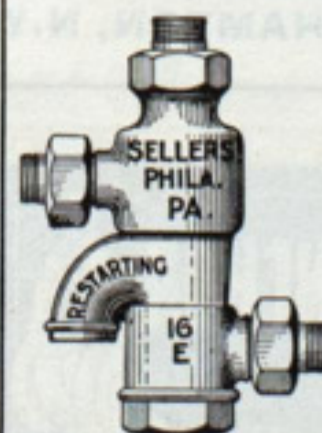
PITTSBURGH, PA.

Bureau of Shipping Information.

Such is the office of the Marine Review, Cleveland. We try to
keep in touch with all that is going on among ship owners and ship
builders and never tire of answering inquiry on this score from ad-
vertising patrons. Write us.

THE MARINE REVIEW PUB. CO., CLEVELAND, O.

Sellers' Restarting Injector



A strictly first
class machine at
moderate cost.

Perfectly auto-
matic, has wide
range of capaci-
ties, and raises
water promptly
with hot or cold
pipes.

Very simple,
has few parts
and is easily
repaired.

All parts interchangeable, made of
the best bronze, and the workman-
ship is perfect. Send for special
catalogue descriptive of this Injector.

JENKINS BROTHERS, Selling Agents
NEW YORK, BOSTON, PHILA., CHICAGO

CHAS. CORY & SON,

Manufacturers of the
Mechanical and Electric
Marine Telegraph,

Electrical

Helm Indicators
Electric Call
Bells.

Engine Bells and
Brass Work of
all descriptions,
Shrieking and
Siren Whistles.

278 DIVISION ST.,
NEW YORK CITY.



THE BABCOCK & WILCOX CO.

HAVE EQUIPPED THE FOLLOWING
LAKE VESSELS WITH THEIR
FORGED STEEL WATER TUBE
BOILERS:

ZENITH CITY,
QUEEN CITY,
EDNA G.,
CRESCENT CITY,
SUPERIOR CITY,
EMPIRE CITY,

ALEX McDOUGALL,
PRESQUE ISLE,
MATAAFA,
MAUNALOA,
MALIETOA,
JOHN W. GATES,

JAMES J. HILL,
ISAAC L. ELLWOOD,
WM. EDENBORN,
W. S. GRATTAN,
HARVARD,
LAFAYETTE,

CORNELL,
PRINCETON,
RENSSELAER,
PARAGUAY,
ASUNCION.

BOILERS NOW UNDER CONSTRUCTION FOR

U. S. MONITOR WYOMING,
U. S. CRUISER CINCINNATI,
U. S. CRUISER RALEIGH,
U. S. CRUISER TACOMA,
U. S. CRUISER GALVESTON,
U. S. CRUISER CHATTANOOGA,
U. S. CRUISER DENVER,
U. S. CRUISER DES MOINES,
U. S. CRUISER CLEVELAND,
AND SEVERAL LARGE VESSELS FOR THE PACIFIC COAST.

The Babcock & Wilcox Co.,

85 LIBERTY ST.,

NEW YORK.

THE BUFFALO DRY DOCK CO.

GANSON STREET AND BUFFALO RIVER.

Operating Four Docks, Sixty-ton Shear Legs, and in every way Equipped

WITH MODERN MACHINERY FOR

Prompt and Economical Repairs

AND FOR THE BUILDING OF STEEL AND WOODEN SHIPS.

Edward Smith, President, Tel. 279 Seneca.
Edward Smith, Residence Tel. 209 Bryant.

OFFICE, GANSON ST., TELEPHONE 515 SENECA.

Geo. B. Drake, Ass't to President, Residence Tel. 798 Bryant.

THE ROBERTS BOILER CO.

HAS BUILT OVER 1000 BOILERS TO DATE

For Launches, Yachts, Passenger and Freight Steamers,
Dredges, Tugs, Stern-wheelers, Canalers;
Also for Navy Department, War Department, Treasury Department,
Light-House Board and Revenue Cutter Service;
Also for N. Y. Dock Department and U. S. Supervisor, Harbor of N. Y.

SAFETY AND ECONOMY.

NEVER KILLED A MAN OR HAD A SERIOUS ACCIDENT. \$250,000 capital. Works covering 29,000 square feet of ground. Never had a boiler returned on account of dissatisfaction. Every boiler warranted. All material made specially for our use. All boilers tested at 500 pounds hydrostatic pressure and 250 pounds of steam before shipping. Workmanship strictly first-class. All joints screwed and reliable. No expanded joints. State your requirements and we will furnish specifications. Correspondence solicited.

THE ROBERTS SAFETY WATER TUBE BOILER CO.,

Works, Red Bank, N. J. 39 and 41 Cortlandt St., NEW YORK CITY.

TELEPHONE: { NEW YORK OFFICE, 599 CORTLANDT. Cable Address, "BRUNIVA, NEWYORK."
OFFICE OF WORKS, 49 RED BANK, N. J.

ALL THE NAVIES OF THE LEADING GOVERNMENTS
OF THE WORLD USE

The Nielausse Water Tube Boiler,

ADOPTED BY THE NAVIES OF

UNITED STATES,	RUSSIA,	SPAIN,
ENGLAND,	ITALY,	Argentine Republic,
FRANCE,	GERMANY,	CHILI.

We have now in course of construction at our Works 60,000 H.P. Nielausse Boilers for the following war vessels:

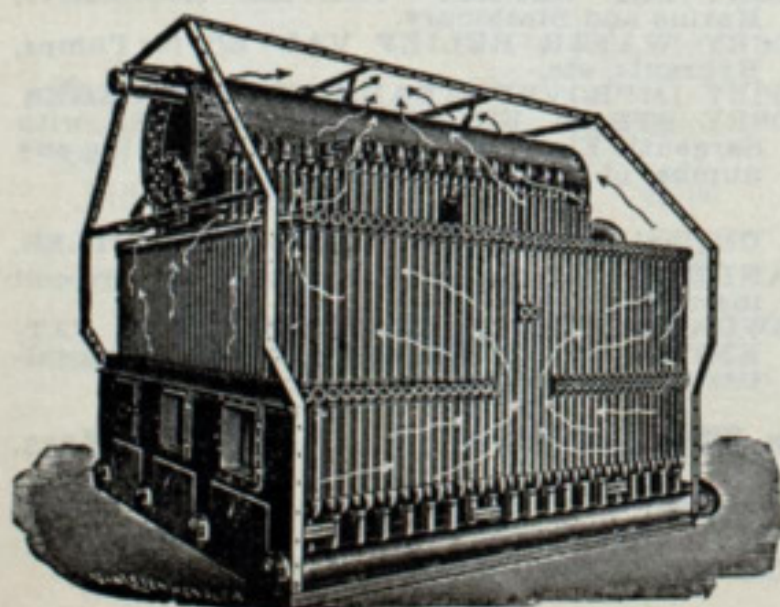
U. S. Monitor CONNECTICUT,	{ Building at the Ship Yard of the Bat Iron Works, Bath, Me.
U. S. Battleship MAINE,	{ Building at Wm. Cramp & Sons Ship Yards, Philadelphia.
Russian Battleship RETVIZAN, Russian Cruiser VARIAG,	

THE STIRLING COMPANY,

Write for Descriptive Matter.

General Offices Pullman Building, Chicago, Ill.

THE "TAYLOR" YACHT BOILER



Has held the record three seasons on the fastest yacht on the great lakes.

Guaranteed against Rupture of Tubes.

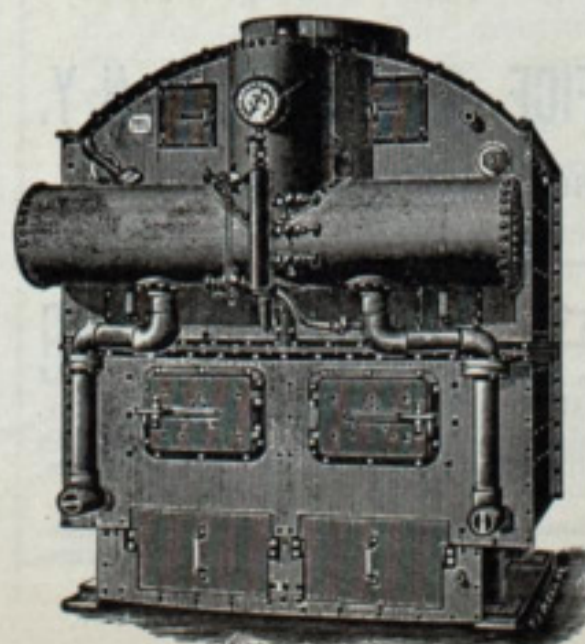
Will not Prime in the Roughest Sea.

MANUFACTURED BY

Detroit Screw Works,

FOOT OF REOPELLE ST.,

DETROIT, MICH., U. S. A.



ALMY'S PATENT

SECTIONAL

Water Tube Boilers.

NOW USED IN

Thirty Passenger Boats and 100 Steam Yachts ranging from 50 to 250 feet in length,
U. S. Torpedo Boat "Stiletto."
Numerous Small Launches and Stationary Boiler also giving most excellent results.

ALMY WATER-TUBE BOILER CO.,

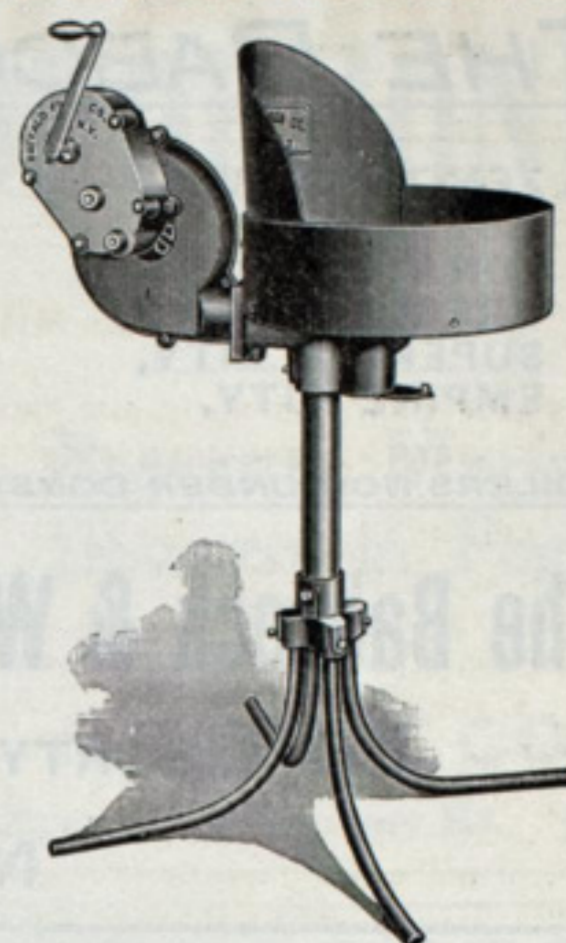
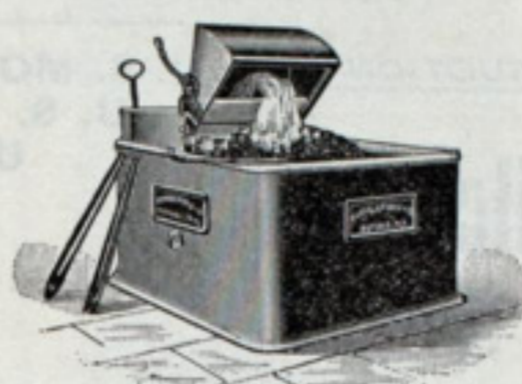
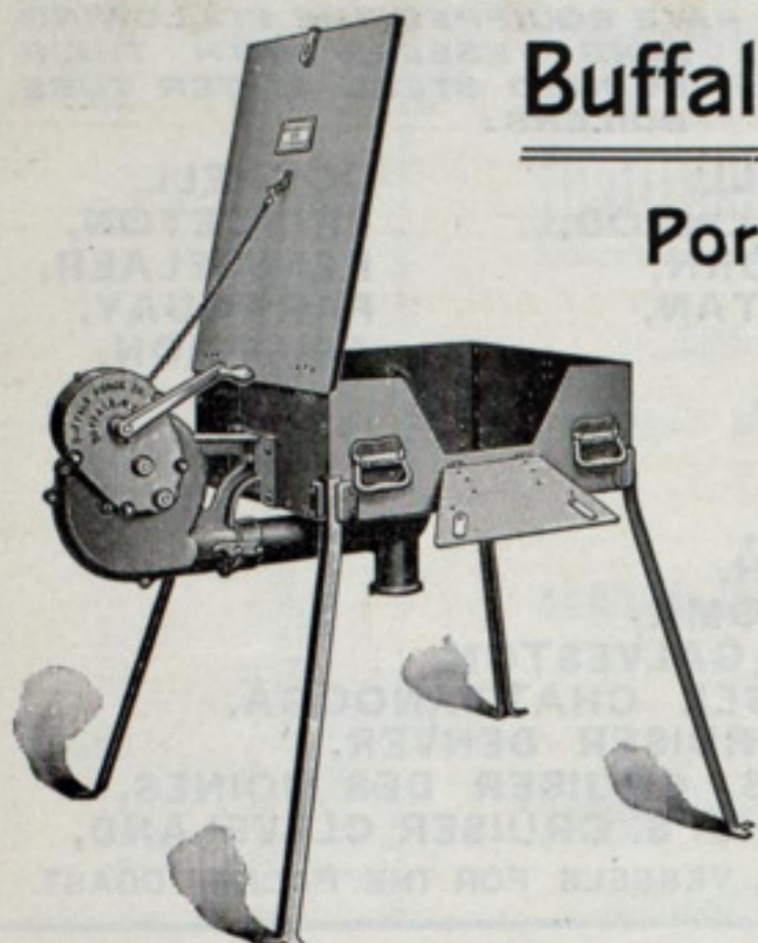
178-184 Allens Avenue,
near Rhodes St.

PROVIDENCE, R. I.

Buffalo Forge Company Forges.

Portable Folding Forges FOR LIGHT OUTDOOR
AND SHIPBOARD USE.

Down Draft Forges FOR HEAVY FORGE
SHOP WORK.



BUFFALO FORGE COMPANY, Buffalo, N. Y.

The Shipowners Dry Dock Co.

CHICAGO.

Repairs to
Steel and Wooden Vessels.

Three Docks at Halsted
Street and North Branch.

OFFICES, 21 AND 23 SHERMAN STREET.

OFFICE TELEPHONE, HARRISON 1020.
YARD TELEPHONE, NORTH 759.

W. W. WATTERSON, SUPT.



ASHTON

CAM LEVER POP SAFETY VALVES
AND NON-CORROSIVE STEAM GAGES

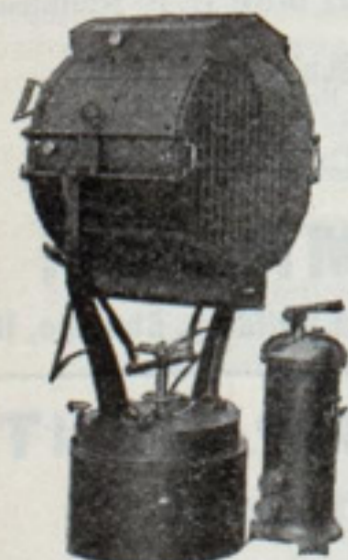
give highest efficiency and durability. Specify them
and get the best.

THE ASHTON VALVE CO.,

BOSTON, NEW YORK
AND CHICAGO, U. S. A.



GENERAL ELECTRIC COMPANY'S Projectors.



NAVAL PROJECTOR.
ELECTRICAL CONTROL.

HAND, PILOT-HOUSE OR
ELECTRICAL CONTROL.

Operated from direct-current
incandescent lamp circuits.

Write for Catalogue No. 1025.

GENERAL OFFICE, SCHENECTADY, N. Y.

SALES OFFICES IN ALL LARGE CITIES.

EUROPE

ARE YOU GOING?

If so, sail from BOSTON on one
of the Fast Steamers of the

DOMINION LINE

Crossing the Atlantic under 7 days.

S. S. Commonwealth, (new) 13,000 tons, twin screw; S. S. New England, 11,600 tons, twin screw; S. S. Canada, 9,000 tons, twin screw. Sailing from B. & M. R. R. docks, Boston, Wednesdays, for Queenstown and Liverpool.

PORTLAND-LIVERPOOL SERVICE S. S. Dominion, S. S. Vancouver, S. S. Cambrian. Short sea passage. For passage, plans, and information regarding these services, apply to or address local agents or

RICHARDS, MILLS & CO., 77 to 81 State Street, BOSTON.

THE BOURNE-FULLER CO.

CLEVELAND O.

BAR IRON.

PIC IRON.

ARCHES AND STRAPS FOR WOODEN VESSELS.

BOILER RIVETS. BOILER TUBES. BRACE IRON.
IRON AND STEEL SHEETS. MACHINERY AND TOOL STEEL.

BESSEMER AND OPEN HEARTH STEEL.

SHIP PLATES, BOILER PLATES, SHIP RIVETS.
BEAMS, CHANNELS, ANGLES, BARS, AND OTHER SHAPES.

BILLETS, BLOOMS AND FORGINGS.

"BYERS" FULL WEIGHT WROUGHT IRON PIPE.

CROSBY STEAM GAGE AND VALVE CO.



CROSBY POP SAFETY VALVES, Locomotive, Marine and Stationary.
CROSBY WATER RELIEF VALVES, for Pumps, Hydrants, etc.
CROSBY IMPROVED STEAM PRESSURE GAGES
CROSBY STEAM ENGINE INDICATORS, with Sargent's Electrical Attachment for taking any number of Diagrams simultaneously.

The Original SINGLE BELL CHIME WHISTLES.
BRANDEN PUMP VALVES; rubber with wire-coil insertion.
BOSWORTH FEED-WATER REGULATOR, PATENT GAGE TESTER, and many other specialties in Steam Lines.

Main Office and Works: Boston, Mass.

Stores; Boston, New York, Chicago, and London Eng.

WE WILL REPAIR YOUR STEAM FITTINGS PROMPTLY.